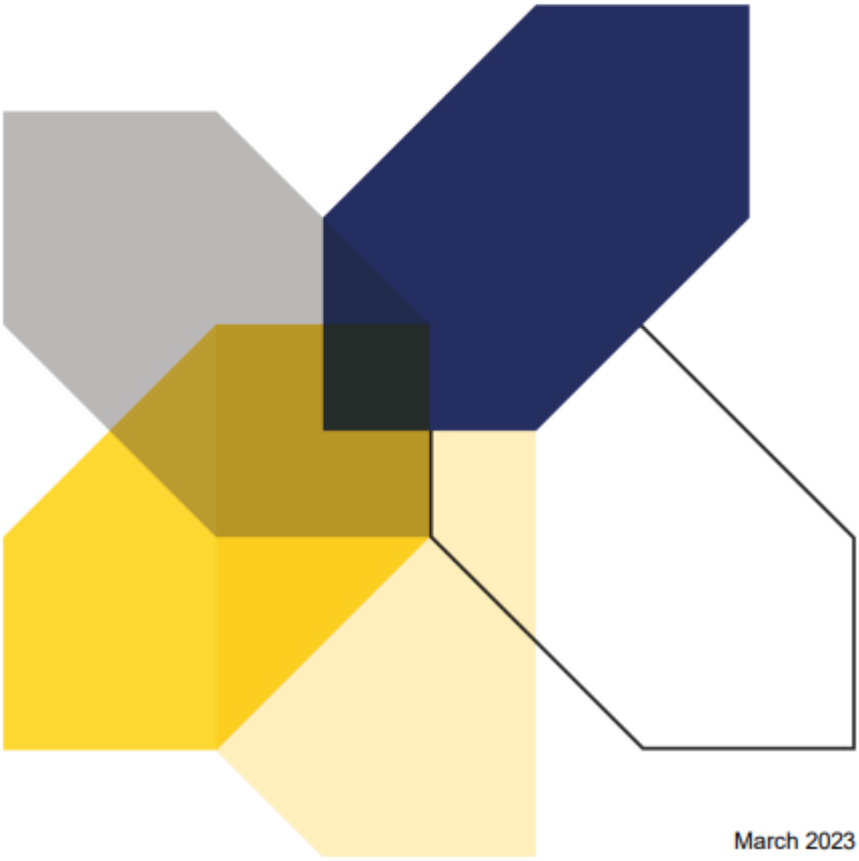
**Appendix CL2.20**

**Draft (2023) National Policy Statement for National Networks**

Department for Transport

# Draft National Policy Statement for National Networks



March 2023

3.3 Evidence that development on the network leads to induced demand is limited. A recent literature review[35] suggested that the scale of any induced demand is likely to vary depending on circumstances. Under Department for Transport's Transport Appraisal Guidance[36], government-funded investments in transport schemes need to consider the effects of variable demand (and the resultant induced or suppressed traffic) on the justification for intervention.

## Climate change adaptation

4.30 Section 10(3)(a) of the Planning Act 2008 requires the Secretary of State to have regard to the desirability of mitigating, and adapting to, climate change in designating an NPS.

4.31 This section sets out how applicants and the Secretary of State should take the effects of climate change into account when developing and considering infrastructure applications. As referenced in chapter 2 of this NPS, while climate change mitigation is essential in minimising the most dangerous impacts of climate change, previous global greenhouse gas emissions have already committed us to continued climate change in the future.

4.32 Article 7 of the Paris Agreement establishes a global goal on adaptation – of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change in the context of the temperature goal of the Agreement. It aims to significantly strengthen national adaptation efforts, including through support and international cooperation.

4.33 To support planning decisions, the government produces a set of UK Climate Projections and has developed a statutory National Adaptation Programme[80]. In addition, the government's Adaptation Reporting Power invites authorities (a defined list of public bodies and statutory undertakers, including National Highways, Network Rail and the Office for Rail and Road) to assess the risks presented by a changing climate, include policies and actions to address climate risk, and set out progress made.

4.34 In certain circumstances, measures implemented to ensure a scheme can adapt to climate change may give rise to additional impacts. For example, as a result of protecting against flood risk, there may be consequential impacts on coastal change (see paragraphs 5.95 to 5.110). If this happens, the Secretary of State should consider the impact of the latter in relation to the application as a whole and the impacts guidance set out in chapter 5 of this NPS.

4.35 In preparing measures to support climate change, adaptation applicants should consider whether nature-based solutions could provide a basis for such adaptation. In addition to avoiding further greenhouse gas emissions when compared with some more traditional adaptation approaches, nature-based solutions can also result in biodiversity benefits as well as increasing absorption of carbon dioxide from the atmosphere (see also paragraphs 5.170 to 5.194 on the role of green infrastructure).

4.36 New national networks infrastructure will typically be a long-term investment and will need to remain operational over many decades, in the face of a changing climate. Consequently, applicants must consider the direct (e.g. flooding of road or rail infrastructure) and indirect (e.g. flooding of other parts of the road or rail network) impacts of climate change when planning the location, design, build, operation and maintenance. The Secretary of State will need information on how

the proposal will take account of the projected impacts of climate change and remain resilient.

4.37 The Secretary of State should be satisfied that applications for new national networks infrastructure have taken into account the potential direct and indirect impacts of climate change. This should include using the latest UK Climate Projections and associated research and expert guidance (such as the Environment Agency's Climate Change Allowances for Flood Risk Assessments[81]) applicable at the time the environmental assessment was prepared as part of their Development Consent Order application, to ensure they have identified mitigation or adaptation measures. This should cover the estimated lifetime of the new infrastructure, with a high level of climate resilience built-in from the outset. The applicant should also be able to demonstrate how proposals can be adapted over their predicted lifetimes to remain resilient to a credible maximum climate change scenario. Should a revised set of UK Climate Projections or associated research be applicable after the preparation of the environmental assessment, the Examining Authority should consider whether they need to request further information from the applicant.

4.38 The Secretary of State should be satisfied that there are no features of the design of new national networks infrastructure critical to its safety or operation which may be seriously affected by more radical changes to the climate. Beyond that projected in the latest set of UK climate projections and taking account of the latest credible scientific evidence[9] on, for example, sea level rise. The Secretary of State should also be satisfied that necessary action can be taken to ensure the operation of the infrastructure over its estimated lifetime.

4.39 Any adaptation measures should be based on the latest set of UK Climate Projections, the government's latest UK Climate Change Risk Assessment, when available[82] and in consultation with the Environment Agency's Climate Change Allowances for Flood Risk Assessments. Any adaptation measures must themselves also be assessed as part of any environmental assessment, which should set out how and where such measures are proposed to be secured.

4.40 Adaptation measures should be required to be implemented at the time of construction where necessary and appropriate to do so. However, where they are necessary to deal with the impact of climate change, and that measure would have an adverse effect on other aspects of the project and/or surrounding environment (for example coastal processes), the Secretary of State may consider requiring the applicant to ensure that the adaptation measure could be implemented should the need arise, rather than at the outset of the development (for example reserving land for future extension or increasing height of existing, or requiring new, sea walls). In these circumstances, the applicant should make a case to justify implementing adaptation measures later, set out clearly how the design could be adapted and have mechanisms in place (such as Development Consent Order requirements) for monitoring and implementation of these future adaptation measures.

4.41 The generic impacts advice in this NPS provides additional information on climate change adaptation. In particular, this section should be read alongside

[9] For example, additional maximum credible scenarios from the Intergovernmental Panel on Climate Change or Environment Agency.





paragraphs 5.95 to 5.110 (coastal change and marine impacts), paragraphs 5.120 to 5.145 (flood risk), and paragraphs 5.243 to 5.259 (water quality and resources).

### Applicant's assessment

5.29 A whole life carbon assessment should be used to measure greenhouse gas emissions at every stage of the proposed development to ensure that emissions are minimised as far as possible as we transition to net zero. This includes the construction, maintenance, operation and use of the asset across its entire lifecycle. This is critical at early stages of project planning, for example, the conception stage, because the ability to reduce whole life carbon emissions is increasingly more limited as the project passes through detailed design and enters construction.

5.30 All proposals for national network infrastructure projects should include a whole life carbon assessment at critical stages in the project lifecycle, for example the submission of a major business case. This should be conducted according to the guidance, standards and methodologies set out in Transport Appraisal Guidance Unit A3. Also refer to the Environmental Assessment at paragraphs 4.10 to 4.11 for more information about cumulative assessment.

5.31 Having regard to current knowledge, a carbon management plan should be produced as part of the Development Consent Order submission and include:

- an explanation of the steps that have been taken to drive down the climate change impacts at each of those stages
- how operational emissions and, where applicable, emissions from maintenance activities, have been reduced as much as possible through the application of best available technology for that type of technology (recognising that in the case of road





projects while the developer can estimate the likely emissions from road traffic, it is not solely responsible for controlling them)
- whether and how any residual carbon emissions will be (voluntarily) offset or removed using a recognised framework
- where there are residual emissions, the level of emissions and the impact of those on national and international efforts to limit climate change, both alone and where relevant in combination with other developments at a regional or national level, or sector level, if statutory sectoral targets are developed and come into force

### Mitigation

5.32 Applicants should look for opportunities within the design of the proposed development to embed nature-based or technological solutions to mitigate, capture or offset the emissions of construction.

5.33 Steps taken to minimise, capture and offset emissions in design and construction, should be set out in a Greenhouse Gas Reduction Strategy, secured under the Development Consent Order. This Strategy could include, for example, mitigation through woodland creation on or adjacent to the site and registered with the Woodland Carbon Code[91], contributing significantly to offsetting residual emissions. Applicants may wish to refer to the Institute of Environmental Management and Assessment Greenhouse Gas Management Hierarchy guidance when drafting their Greenhouse Gas Reduction Strategy[92].

## Appendix CL2.21

## Road Investment Strategy 2 (2020–2025)

Department for Transport

# Road Investment Strategy 2: 2020–2025

March 2020

1173

CORRECTION SLIP

Title: Road Investment Strategy 2: 2020-25

Session: 2019-21

ISBN: 978-1-5286-1678-2

Date of laying: 11th March 2020

Correction:

*Removing duplicate text on the M62 Junctions 20-25 smart motorway*

Text currently reads:

(Page 95) **M62 Junctions 20-25** – upgrading the M62 to smart motorway between junction 20 (Rochdale) and junction 25 (Brighouse) across the Pennines. Together with other smart motorways in Lancashire and Yorkshire, this will provide a full smart motorway link between Manchester and Leeds, and between the M1 and the M6.

This text should be removed, but the identical text on page 96 remains.

Correction:

*Correcting a heading in the eastern region*

Heading currently reads:

**Under Construction**

Heading should read:

**Smart motorways subject to stocktake**

Date of correction: 11th March 2020

# Road Investment Strategy 2: 2020–2025

Presented to Parliament pursuant to section 3 of the Infrastructure Act 2015

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# Contents


| | |
|---|---|
| **Ministerial Foreword** | **1** |
| **Introduction** | **3** |
| **Part 1: Strategic Vision** | **5** |
| **Part 2: Performance Specification** | **45** |
| **Part 3: Investment Plan** | **69** |
| **Statement of funds available** | **119** |
| **Glossary and References** | **123** |

# Ministerial Foreword

This Road Investment Strategy is not a blueprint for pouring concrete, laying tarmac or welding steel.

This is first and foremost a document with people at its heart.

If we are to invest £27.4 billion over the next five years on our strategic road network, it is crucial that we use this funding to improve the lives of all.

That's why a central principle in the development of this strategy was to create a road network that is safe, reliable and efficient for everyone – whether they are cyclists or drivers, passengers or pedestrians.

This document lays out how we will achieve that goal and use road investment to meet the needs of modern society – from helping businesses get their products to market smoothly, to ensuring commuters can arrive at work on time.

In doing so, our first priority is to fix the strategic roads we have today – ensuring that they are well designed, well maintained, well connected, and will continue to serve all road users well into the future.

Only where existing roads are simply not up to the job the country asks of them are we asking Highways England to develop wider, realigned or, in a few cases, wholly new roads to keep people and goods moving.

But this Strategy is not just focused on road users – it also focuses on fulfilling our obligations to communities living close to major routes and towards the natural, built and historic environments.

There is no doubt that balancing these needs with the demands of the 21st century will at times require compromise and difficult choices. But I am confident that this Strategy targets funding in a way that supports all these objectives.

This document also explores how we can use our road network as a way of levelling up the UK's economic performance and addressing social inequalities.

By carefully focusing investment to improve transport links, while ensuring we get the basics right, we can open up new educational, health, work or social horizons for people living across the country.

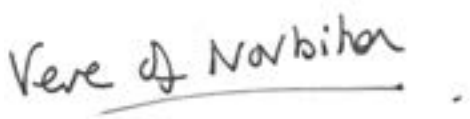
The publication of this Strategy lays out our plans for strategic road investment over the next five years.

But it also looks much further ahead as well. It sets out an ambitious vision for the shape of the network in 2050, along with the practical steps we plan to take with Highways England to turn it into a reality.

Of course, there is no crystal ball to show what the future may hold.

But by acting today we can be more confident of seizing the opportunities of tomorrow to the benefit of road users, taxpayers and the country as a whole.

**Rt Hon Grant Shapps MP**
Secretary of State for Transport



**Baroness Vere of Norbiton**
Parliamentary Under Secretary of State

# Introduction

## What is the RIS?

In 2014, the Government reformed the way that England's strategic roads were funded and managed. While safety remained the number one focus, the new arrangements also gave new emphasis for customer service and delivery.

Highways England was established as the steward of the strategic road network (SRN), with a remit to operate, maintain, renew and enhance our motorways and main 'A' roads to the benefit of road users, people who live next to or depend on the network, and the natural, built and historic environment.

Government committed to a five-year funding settlement, the first Road Investment Strategy (RIS1), which allowed Highways England and its supply chain to plan their work efficiently and provided the confidence needed for them both to invest in people and equipment, growing the skills and capability necessary to deliver the scale of improvements planned to the network. RIS1 invested some £17 billion in our strategic roads – not only in upgrades, but in maintenance and measures to address the effects that old roads have on nearby communities.

The Office of Rail and Road (ORR) and Transport Focus were given specific roles as independent highways monitor and watchdog respectively to ensure that Highways England does what it should, and does so efficiently, and that the interests of the road user are taken fully into account.

Now, five years later, the Government is building on the foundations of this reform with a plan to achieve more for road users, residents and businesses, natural habitats and wildlife, townscapes and landscapes.

Funding for this plan is directly linked to the money road users pay. For the first time since 1926, a new National Roads Fund (NRF) will dedicate a sum equal to all receipts from Vehicle Excise Duty for use on our most strategically important roads. Not only does this provide the security of a long-term funding stream, the link reinforces our ambition for greater customer service and responsiveness to users.

This second Road Investment Strategy (RIS2) sets a long-term strategic vision for the network. With that vision in mind, it then: specifies the performance standards Highways England must meet; lists planned enhancement schemes we expect to be built; and states the funding that we will make available during the second Road Period (RP2), covering the financial years 2020/21 to 2024/25.

In total, RIS2 commits the Government to spend £27.4 billion during RP2. Some of this will be used to build new road capacity, but much more will be used to improve the quality and reduce the negative impacts of the existing SRN, so that every part of the country will benefit.

Through this investment we want to make the network safer, more reliable, and more

sensitive to the places through which it runs. With a stronger focus on the differing needs of road users and adoption of new working practices and technologies, we want people using the network to enjoy smoother, more consistent journeys. By making the most of green infrastructure and good design, we want people living alongside the network to experience less noise, light and air pollution. And this RIS must support the Government's wider plans for decarbonising road transport.

The NRF will also provide funding to enhance the Major Road Network (MRN), the most important roads owned and operated by local highway authorities, and contribute to large local major road schemes. This investment complements the funding the Department provides for maintenance of local roads, and will help secure a consistent and coherent network of regionally-important roads that are seamlessly integrated with the SRN.

Roads are, and will remain, vital to our way of life and our SRN encompasses the roads that are most important for people to get around the country and for businesses to receive supplies and get their goods to market. Our plan will help ensure that they continue to deliver for the country.

## How has RIS2 been developed?

RIS2 has been developed on the back of an extensive round of public engagement and consultation, research and evidence gathering begun in 2016. It has been the biggest exercise ever undertaken to inform national road investment and has enabled us to build a well-informed picture of the current performance of the network, future pressures on it, and the opportunities available for improvement.

While not all the issues facing the SRN can be resolved in any single RIS, the information we have gathered is helping us to build a pipeline of activity into the future so that, over time, we can realise our strategic vision.

Significant steps in the process have been Highways England's route strategies, strategic studies, *Road to Growth* and *Connecting the Country* plans; Transport Focus's research into road user priorities; and the Department's public consultation on Highways England's proposals in their Initial Report.[1] The Draft RIS published in October 2018 set out the Government's objectives for RIS2 based on the consultation and engagement at that point.[2]

During this process the sub-national transport bodies have emerged as important partners, whose strategies and studies are providing robust information on the priorities for each part of the country. We recognise the aspirations of these bodies as they progress in maturity to work even more closely on the development of the next RIS and that is something we will explore with them in the coming months.

Since publishing the Draft RIS, the Department has been working with Highways England to develop an affordable, deliverable strategy that meets the Government's objectives. ORR has provided advice on whether the emerging plans were challenging and deliverable, and the level of efficiency they represented. Our final decisions set out in RIS2 are the culmination of this work.

1 At: www.gov.uk/government/consultations/shaping-the-future-of-englands-strategic-roads-ris2
2 At: www.gov.uk/government/publications/draft-road-investment-strategy-2-government-objectives

# Part 1
# Strategic Vision

A57
Sheffield (SE)
Rotherham (S)

**In a changing world, where the demands on our SRN and the opportunities provided by new technology to meet those demands are developing rapidly, our strategic vision seeks to ensure that the SRN is 'future ready', whatever may emerge.**

**In this section we define the purpose of the SRN and the strategic role it has to play in serving the needs of road users, the communities and environmental setting through which it passes, and the country at large.**

**It then describes a long-term vision for what the SRN should be like in 2050 and the steps that will help us achieve it. This will give Highways England, along with its customers, suppliers and other stakeholders, a clear sense of the Government's objectives for the SRN, and a direction of travel for the way ahead across future road periods.**

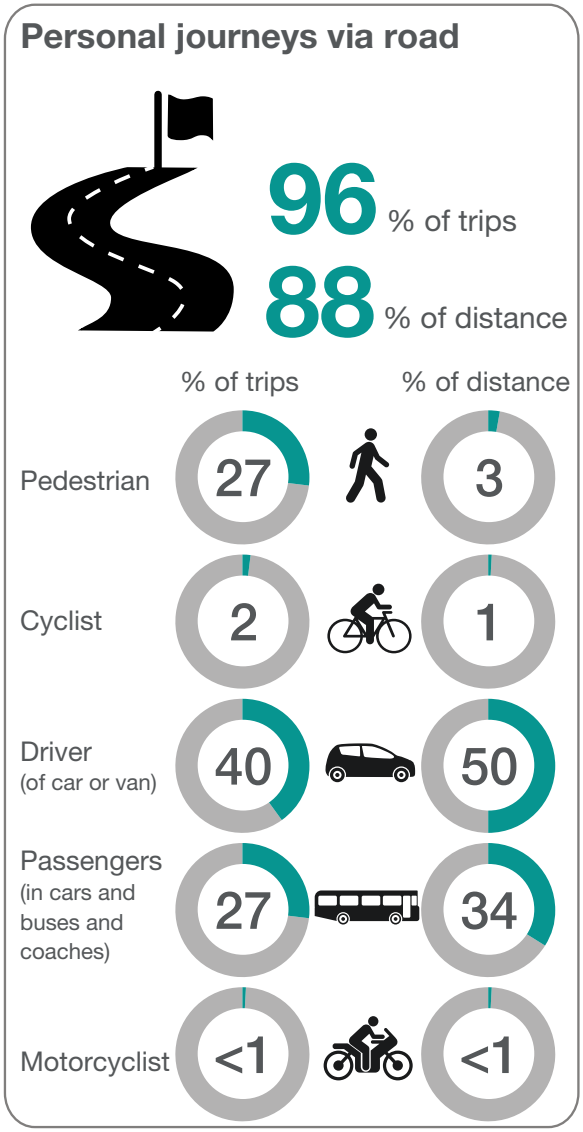
# a. Making transport work

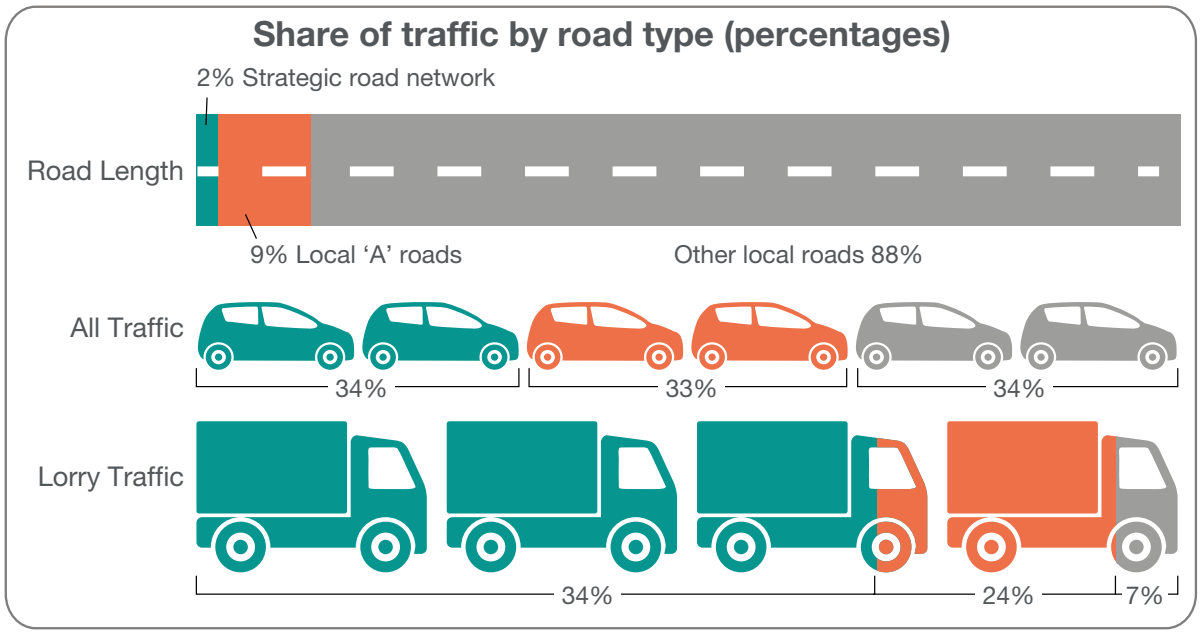
## Why roads?

A good transport network is not an end in itself, rather it is the means through which people and businesses live their lives and achieve their ambitions. The provision of a safe, reliable, resilient, responsive and efficient transport network can significantly expand the opportunities for success and encourage greater ambitions. Conversely, a failing network that lacks capacity and performs poorly will limit what people can achieve.

The dramatic expansion of railway, road and aviation networks over the last two centuries each transformed the way people thought about the world and its possibilities. Containerisation and new ways of doing business have revolutionised maritime and land-based logistics. Urbanisation and modern lifestyles have inspired a resurgence in urban transit systems and cycling for work and leisure. Rapid developments in technology are changing patterns of demand for transport, but are not reducing the need or the desire to travel.

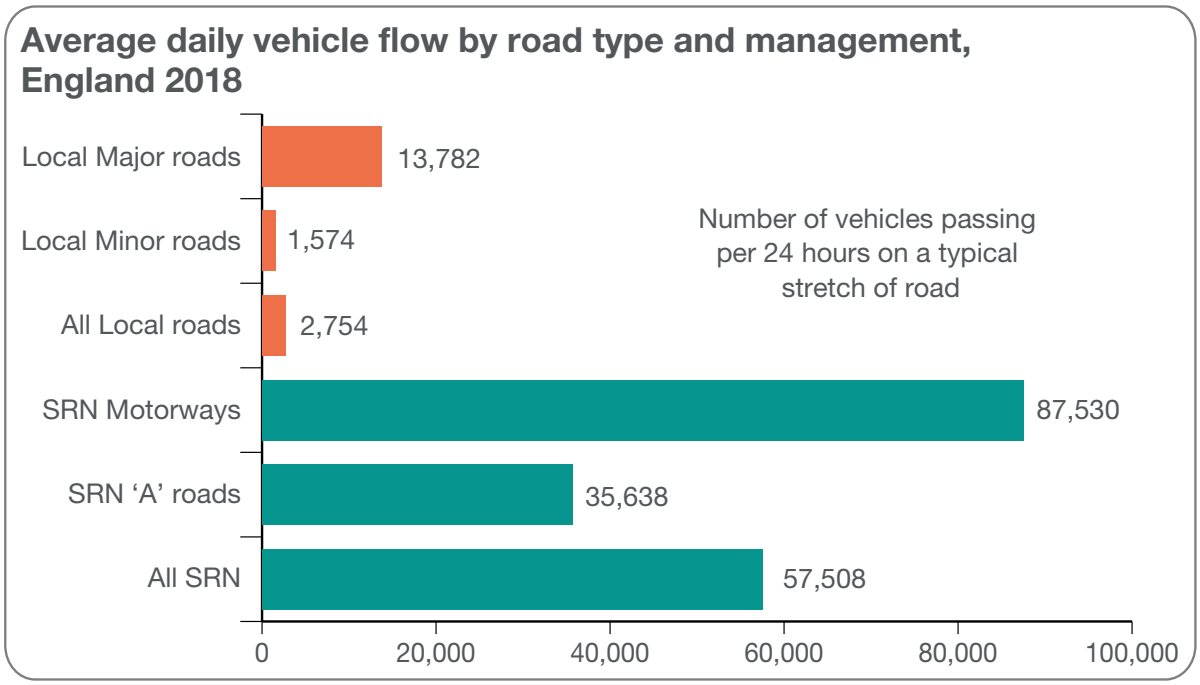
The Government is providing substantial investment across the country and across transport modes to sustain safe, reliable, resilient, responsive and efficient networks that can unlock economic and social benefits. Roads are an important part of the mix, used as they are by pedestrians; cyclists; horse-riders; motorcyclists; drivers of cars and vans; and passengers in cars, buses and coaches. In total, 96% of all personal journeys are made by these modes, amounting to 88% of distance travelled. Businesses and heavy goods vehicle (HGV)






drivers also depend on roads, with over three times the amount of goods moved by road than by rail and water combined. Put simply, we depend on roads for our way of life.

Within these totals, the SRN plays an important role for long-distance traffic, especially freight. One-third of all motor vehicle miles are made on the SRN, and that rises to two-thirds for HGVs. Traffic flows on these roads average 57,500 vehicles per day,



compared to 2,800 on local roads. Even on major local roads, average traffic flow is a quarter of that on the SRN. These journeys represent significant value for the country, enabling efficient freight logistics and underpinning many people's choices of where to live and work.

Like any transport mode, roads have an impact on the people and places around them arising from both the infrastructure itself and the vehicles using it. Investment and innovation in the use of green infrastructure[3] and new technology open up opportunities for minimising the impacts of both these elements. These include the use of modern road surfaces and place-sensitive planting of vegetation, adoption of low emission and connected vehicles, encouraging vehicle sharing and active travel modes and, in some cases, avoiding the need for travel altogether.

Roads and particularly the SRN will continue to have a significant role in enabling people and goods to move around the country, so we have to make them work for everyone, including road users and communities. Roads Reform in 2014 and our decision to hypothecate Vehicle Excise Duty raised in England from 2020, both provide a long-term commitment to investment in our most strategically important roads and a link to the money that road users pay, and will ensure that the SRN is able to play that role successfully now and into the future.

## Ready for whatever the future holds

Demand for the SRN is affected by a range of demographic, economic, lifestyle, technological, and resource factors. We have to think about how these factors may affect patterns of use when deciding where to prioritise investment to ensure the SRN meets today's demands, not those of the past, and is ready for a range of possible future scenarios. In appraising RIS2, we have used Highways England's Regional Traffic Models and our most recent assessment of future demand scenarios, *Road Traffic Forecasts 2018* (RTF18).[4]

Traffic growth on the SRN is forecast to be strong and positive in all scenarios considered by RTF18, ranging between growth of 29% and 59% by 2050, driven by forecast increases in the number of car trips and trip distances, as well as increasing Light Goods Vehicle traffic. This follows a recent growth of approximately 11% in vehicle numbers on the SRN between 2013 and 2018.

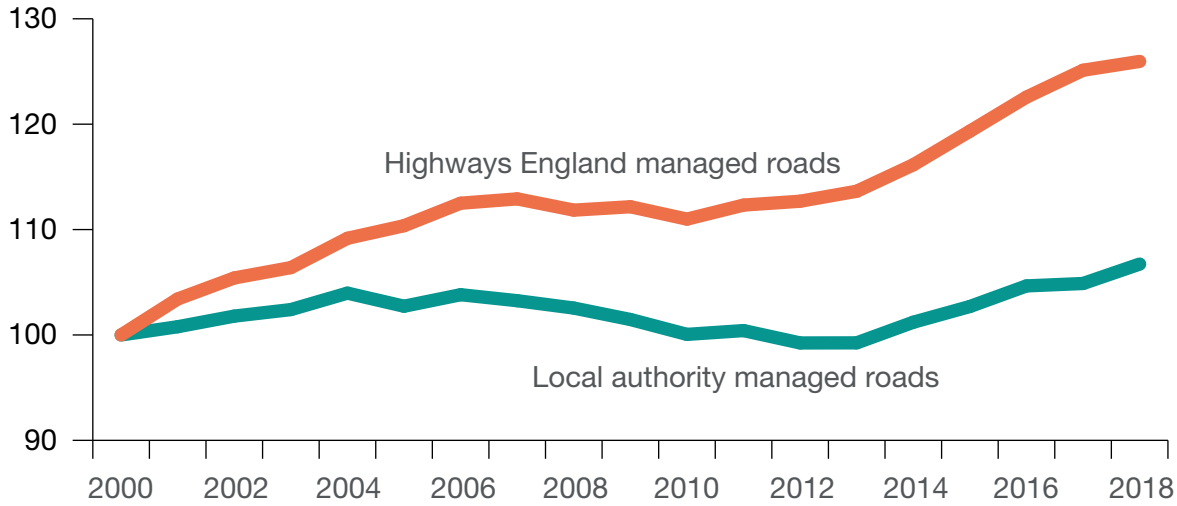
We recognise that overall trip rates for the majority of trip purposes have been declining and there is a trend of more young people not learning to drive. Thus we have explored a scenario where these trends continue out to 2050. However, these changes that would reduce demand are outweighed by the increase in journeys made by older drivers, and the expectation of a continued rise in total population. In addition, holiday trips are forecast to more than double by 2050, resulting in longer average distance car trips. As longer trips are more likely to be routed on the SRN, demand is likely to continue to grow faster than on local roads.

RTF18 also considered the possible impacts of new technology on demand. There is much uncertainty about how fast and deep new technologies will be adopted in the transport sector, and how people and

3 Strategically planned and managed green spaces and other environmental features; detailed guidance is at: publications.naturalengland.org.uk/publication/35033?category=49002

4 At: www.gov.uk/government/publications/road-traffic-forecasts-2018

**Motor vehicle traffic in England by road management, 2000-2018**
(Index of vehicles miles 2000 = 100)




businesses will react to them. A number of exploratory tests have been conducted around the possible impacts of Connected and Autonomous Vehicles (CAVs), but all would still produce increased road demand relative to 2015 levels, with a range of growth between 5% and 71% by 2050.

This suggests that even much greater levels of ride sharing will not outweigh the impacts of economic growth and demographic change. The rise of electric vehicles, while essential to achieving the target of net-zero carbon emissions by 2050, has the potential to encourage increased travel on our road network as the costs of driving fall. Taken together, these findings suggest that although the character of road demand is changing, it is plausible that the SRN will continue to experience traffic growth.

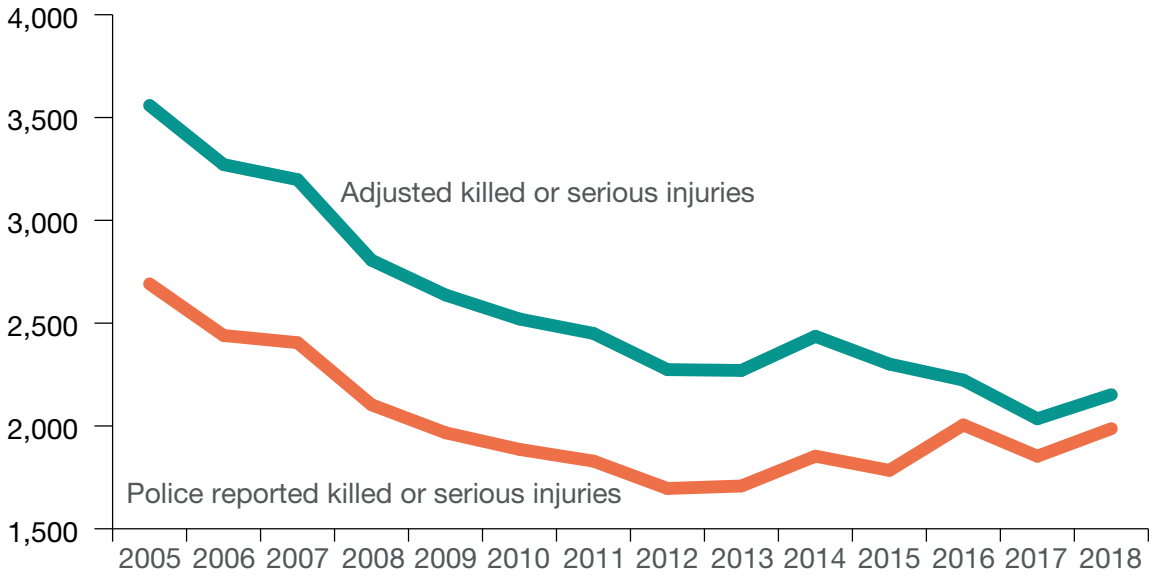
Our investment decisions need to respond accordingly if we are to maintain a network that meets what users want, in particular in terms of safety, reliability and reasonable journey times. It means that the existing network needs to be kept in good condition, with the impact of roadworks and incidents minimised, so that it is resilient. It means taking action on existing pinchpoints which will become even more congested given growth. And it means considering expansions in capacity where that is the best option to meet demonstrable need.

Our strategic vision for the SRN both responds to current traffic demands and also seeks to shape the future use of the network to support the Government's wider policy aims: promoting the importance of place; achieving net gains for the environment and contributing to a wider climate change strategy; and being at the forefront of technological change.

## Progress on delivering the RIS1 Strategic Vision

This is an evolutionary process, building on good work that is already underway. The Strategic Vision in RIS1 set aspirations for a smoother, smarter, sustainable SRN. So far during the first Road Period (RP1):

**People killed or seriously injured on the SRN, 2005 to 2018**




- The number of people killed or seriously injured on the SRN has fallen by 6% from 2015 to 2018 (using adjusted severity figures to account for changes in reporting systems). That represents many more people alive and well today, and families not living with the trauma of loss.
- Free-flowing traffic has been supported by 98.3% lane availability and 88% of motorway incidents cleared within an hour, both ahead of target.
- Road user satisfaction has remained nearly 90%, as measured by the National Road Users' Satisfaction Survey (NRUSS)[5]. Though it is just below target, it has been achieved despite the increasing amount of work being undertaken on the network.
- The global survey of businesses about road quality presents a mixed picture. On quality of road infrastructure, the UK's rating and ranking both improved in the early years of RP1, but fell back in 2019. However, on the new wider measure of road quality and connectivity, the UK ranks 23rd and is on an upward trajectory.[6] A further round of SRN improvements, scheduled to start later this year or early in RP2, should produce improved ratings.
- Highways England has reported £848 million of efficiencies, the equivalent of all the work in RP1 and committed through RIS2 on the A1, and that it is on track to meet its target to achieve £1.2 billion of efficiencies by the end of RP1.

5 At: www.transportfocus.org.uk/research-publications/publications/national-road-users-satisfaction-survey-2018-19/

6 At: http://reports.weforum.org/global-competitiveness-report-2019/competitiveness-rankings/#series=ROADINF

- 951 Noise Impact Areas have been mitigated, which means more than 40,000 people are benefitting from reduced road noise at home.
- Ten air quality pilot studies have been completed and published on Highways England's website. Mitigation measures around the 86 pollution links are being progressed.
- Progress has been made against the Biodiversity Action Plan[7] and annually reported. A biodiversity metric was developed and trialled internally in 2018/19.
- The *Design Manual for Roads and Bridges*[8] is on track to be updated by the end of RIS1; an external sustainable development and environment action plan was released in 2018; and flagship schemes such as the £3 million Stover Park water/biodiversity project have been delivered.

This represents a solid start, especially considering 5 billion more miles are travelled on the SRN than in 2015 – more than the furthest distance from Earth to Pluto – and it is one which we aim to build on in terms of both breadth of ambition and achievement during RP2.

7 At: http://www.standardsforhighways.co.uk/ha/standards/dmrb/index.htm
8 At: www.standardsforhighways.co.uk/ha/standards/dmrb/index.htm

# b. Defining the SRN

The principal purpose of the SRN is to enable safe, reliable, predictable, rapid, often long distance, journeys of both people (whether as drivers or passengers) and goods in England between our:

- Main centres of population;
- Major ports, airports and rail terminals;
- Geographically peripheral regions of England; and
- Chief cross-border routes to Scotland and Wales.

The value of the individual journeys on this network combine to deliver extensive benefits, without which life in the UK would be fundamentally poorer, for example:

- Facilitating economic growth and international trade by enabling businesses to move their goods efficiently to their customers and receive the supplies they need to maintain lean production processes.
- Helping people to choose where they want to live and work, in both rural and urban areas, giving them easier access to a wider range of homes, jobs, education, healthcare and recreation opportunities and a greater chance of enjoying a fulfilling life with friends and family.
- Strengthening the United Kingdom as a union of nations and an international trading economy, with high quality internal and external links and all parts of the country able to enjoy prosperity.

However, the SRN does not stand alone; to fulfil its purpose it must support and be supported by other transport networks. Only the busiest and most important locations, such as international gateways, will have direct access onto the SRN. Design and operation of the SRN should recognise this fact and seek to achieve seamless integration of strategic roads with these other networks.

This means that connections to the local road network, in particular the MRN, are critical for allowing access for most SRN users to or from specific locations. Such connections must balance the needs of local access and the wider ability of the network to function safety and effectively for long-distance traffic. The local road network should enable local journeys to be made efficiently and avoid creating conditions where road users hop on and off SRN routes unnecessarily.

As demand patterns change, and where new infrastructure is constructed, it is important to be ready to amend the geographic extent of the SRN, so that roads best managed at a local level to meet a communities' needs are in the hands of local highway authorities. The establishment of the MRN means that roads transferred from Highways England

control do not necessarily lose access to the NRF for enhancement funding. Similarly, where a road's strategic significance suggests it should be managed by Highways England, the Department is willing to examine the case for adding it to the SRN with the relevant local highway authority.

## Working in partnership

Getting the best out of the SRN requires Highways England to cooperate with a wide range of partners, in particular those with expertise and understanding of local and regional priorities so that decisions are respectful of place. We envisage Highways England cultivating close working relationships, building on those established during the delivery of RIS1 and the research phase for developing RIS2, in particular with:

- Sub-national transport bodies (STB), local authorities (in particular those with local transport responsibilities), and local enterprise partnerships (LEP) to help align activities with local plans for growth, housing and transport provision.
- Devolved administrations in Scotland and Wales, Transport for London, and city region mayors and combined authorities, joining up the road networks across borders where appropriate.
- Police and other emergency services, working to clear up incidents more quickly and promoting safety.
- The Environment Agency and other bodies working to improve the environment, reduce flood risk, and increase resilience to extreme weather and other climate impacts.
- Community organisations, especially those representing neighbourhoods strongly affected by the presence of the SRN and enhancement schemes.
- User groups, in particular those representing users who have specific needs that must be met if they are to enjoy safe, smooth and reliable journeys.

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# c. Vision of the network in 2050

Our vision for an SRN that is fulfilling its purpose in 2050 envisages:

## A network that supports the economy

- The SRN remains the main network through which the nation does business, carrying more traffic per mile than any other part of the transport network. It has evolved and adapted to meet the changing shape of the economy, and its high quality is one of the reasons that businesses choose to invest in the UK.
- The SRN has been 'levelled up' across the nation, so that the SRN and MRN connect all areas well, including those where poor quality links are currently a barrier to growth. This not only includes the technology of today, but also the equipment needed to create the road of the future, so that no part of the country is left in a 'not spot' with gaps in physical or digital infrastructure.
- The SRN supports the freight and logistics industry and continues to carry more freight and more business than any other part of the transport system. It works well to connect together people who are keen to do business and ready to compete in the global economy. It is also a good workplace for those who spend their day on the road.
- The SRN is a reliable way for millions of people to get to work, and gives people the opportunity to look for a job in places that would otherwise be unreachable.
- Provision of strategic road capacity, developed together with wider transport provision, has mirrored the growth in housing so that new journeys can be accommodated without worsening conditions for existing travellers.

## A greener network

- The majority of all vehicles using the SRN, including almost all cars and vans, are zero emission at the tailpipe, transforming the impact of the SRN on air quality and carbon emissions.
- The SRN makes extensive and effective use of environmentally and visually sensitive 'green infrastructure', modern materials and careful planting, including trees. Together, these minimise and mitigate the air, light, noise, visual, and water quality impacts of the SRN on those living or working near to it, and sustain habitats and enhanced biodiversity.

- Enhancements to the network create roads that fit with their surroundings, and which keep negative consequences to a minimum. In particular they have employed high standards of design, responding to place-specific issues and in keeping with the natural, built and historic environment.
- The 'soft estate' (the verges and open spaces adjoining the network) is well designed and maintained.

## A safer and more reliable network

- The SRN is designed and operated in response to what road users want, while also taking into account the impacts that it has on people and places.
- Continued improvements in safety technology, coupled with intelligent management of the network, result in reductions in the numbers of people killed or injured on the SRN. It may be possible to create roads that are entirely collision-free, both for users and for people working on the road.
- Users of the SRN experience reliable journeys, with predictable journey times across the network.
- The condition of road surfaces and other infrastructure around the road is of a consistently high quality, and problems are fixed early before they become an inconvenience. Day-to-day operation of the SRN is treated as equally important to capital enhancements, and the need for disruptive roadworks is minimised.
- Better information is provided for people planning or making journeys at the point they need them, and the power of data has been unlocked to optimise the management of the network and to help people make good choices about how to make their journey.
- The SRN is resilient to climate change and incidents, such as flooding, poor weather conditions, blockages on connecting transport networks.
- Supporting capacity has been added to provide resilience and ensure people and businesses have a greater choice of options that meet their needs. This can mean better roads, other modes of transport, or options that provide alternatives to travel.

## A more integrated network

- The SRN is designed and managed as an integral part of a wider transport network. Users of the SRN do not encounter friction at the points where it joins other networks when planning or undertaking journeys, be they local, regional, national or international. SRN operations are managed in cooperation with other transport providers to help users with their journeys.
- High-quality routes have been provided for cyclists, pedestrians and equestrians, so that they can make their journeys safely, physically separated from motorised traffic on the SRN. These use a variety of methods appropriate to the needs of users, are attractive both for work and leisure travel, and are respectful of place.

## A smarter network

- A 'roads revolution' based on a range of new vehicle technologies has transformed the SRN visibly and powerfully. Highways England is recognised as a global pioneer in the adoption of new technology, and has used this to drive better performance on its network, and shared its expertise to help local highway authorities achieve the same.
- The benefits of artificial intelligence and connectivity enabled by the secure use of the latest technology maximise the efficient use of road space, enabling more journeys to be accommodated and providing the highest standards of user experience.
- A new approach to thinking about mobility, supported by the use of 'big data' and highly-functional transport applications, has transformed people's thinking about journeys, resulting in reductions in costs, emissions and congestion.

## Delivering what users want

The work of Transport Focus has been invaluable for developing our vision of the future of the SRN and the content of RIS2. In particular, we have been guided by Transport Focus's *Road users' priorities for the Road Investment Strategy, 2020-25* research,[9] which organised into nine themes the things that SRN users want to see funded. Examples of how the content of RIS2 addresses each theme are:

| User priority | RIS2 statement |
|---|---|
| **Enhanced safety** | This remains Highways England's first imperative and informs everything it does from design principles, road standards, operational procedures and investment decisions. We will strengthen this ambition through our investment plan, performance specification and targeted safety improvements through the small schemes fund. |
| **Improving journey times** | We will keep up the momentum to reduce the impact of incidents and roadworks via the performance specification, ensuring that Highways England work to minimise time lost to improve travel time reliability. Major improvements will tackle longstanding bottlenecks. |
| **Improved surface quality, signage and lighting** | Highways England's maintenance approach will focus on safety and surface condition to enhance the quality of journeys. New measures of the ride quality experienced by users will track the effectiveness of this approach. |

9 At: www.transportfocus.org.uk/research-publications/publications/road-users-priorities-for-the-road-investment-strategy-2020-25/

| User priority | RIS2 statement |
|---|---|
| **Better information** | Highways England will explore how its data can inform users about incidents when they occur, and help freight operators schedule their journeys. Variable Message Signs and in-car information will be used more flexibly and effectively. |
| **Improved roadside facilities** | We will work with Highways England to explore supporting the provision of lorry parking in the right locations to help address shortages of facilities. We are also working with industry to ensure the existing network of rapid and higher powered chargepoints along the SRN continues to expand to support ultra low emission vehicles. |
| **Better integration with other roads** | Better working across organisational boundaries between Highways England and local highway authorities will provide seamless journeys and greater resilience. |
| **Meeting the needs of bus and coach passengers** | The Users and Communities designated fund will support investment in bus stops and park and ride sites across the network. |
| **Improved provision for non-motorised users** | As well as short-term action to make it easier for these users to travel along or across the SRN, in the longer-term good quality alternative routes for non-motorised users will be an integral part of the design of the SRN. |
| **Future proofing new investment** | Highways England will consider how to protect the current and future interests of the SRN during the design and delivery of major infrastructure projects, monitor developing technologies, and make provision to future proof the network for emergent technologies where it represents value for money. |

# d. Delivering the vision

In order to achieve this vision for the SRN, the Department, Highways England and other partners must take action across multiple areas. Some parts of this task are matters best handled through operational experts with a detailed understanding of conditions on the ground. Others, such as decarbonising road transport, can only be dealt with at a society-wide level. All of these actions must proceed together, in order to achieve the outcomes that the Government aspires to.

## 1. A network that supports the economy

Our strategic infrastructure must support growth and match the way our nation has and will change. To deliver what the nation needs, the SRN must cater to the ways in which our nation changes, and provide entrepreneurs and businesses with the opportunity to innovate and expand our economy. With two-thirds of all HGV miles travelling on the SRN, we cannot afford for the network to provide a second-class service.

It is therefore essential that the management of the road network is linked up with all those working to support growth and deliver the housing the nation needs. The process through which infrastructure supports growth does not occur in a vacuum, but only succeeds when it joins up with the plans and proposals of a wide range of people. Developers, businesses, local authorities, LEPs and STBs are all vital contributors to this process.

The Government is determined to help local places grow sustainably, so that people can have homes in communities where they feel they belong and can access the jobs, goods and services that they need. The SRN must be the ally of this growth, helping local places to absorb change sustainably by supporting people as they seek to lead fulfilling lives and creating the conditions in which businesses can thrive, whether they are serving local residents and tourists, or engaged in international trade and commerce.

### Places where people want to live

The Government has an ambition to deliver an average of 300,000 homes a year by the mid-2020s and the *Fixing our broken housing market* strategy set out the plan to boost the supply of new homes.[10] As new housing and commercial areas are developed, it is important that the SRN is ready to enable that growth, and that a lack of critical capacity does not act as a barrier. Where the SRN passes through existing residential areas, it is important that its impact on the people who live there is carefully managed, with steps taken to reduce air, light and noise pollution, and to

10 At: www.gov.uk/government/publications/fixing-our-broken-housing-market

ensure that the road network is not a barrier for people going about their lives. Therefore, we will:

- Unlock new areas for housing growth, working closely with other government departments and local authorities to understand their needs. For example developments at Northstowe in Cambridgeshire, a new town on the site of an old barracks that will eventually have up to 10,000 homes, have been unlocked by the RIS1 upgrade to the A14.
- Join up investment so that RIS2 works in partnership with government programmes to support the delivery of housing and other investments in our national productivity. This includes linking the existing expertise developed through the RIS1 Growth and Housing designated fund so it can support the Government's £5.5 billion Housing Infrastructure Fund (HIF). This means that as the RIS2 programme is developed it will be mindful of the funded commitments of programmes such as HIF and that their delivery programme will be considered as the delivery plan for RIS2 is developed.
- Help local partners explore ways in which land value capture can be used to support new infrastructure.
- Be ready to explore investment with developers who want to enhance capacity on the SRN to help their activities.

## Economic growth and productivity

As we seek to support economic growth across all parts of the country, and exploit new international trading opportunities, our core national transport networks require investment to provide businesses with good connections. Not all parts of the country possess world-class roads, and the Government is committed to a levelling up of Britain's infrastructure.

Through RIS2 we aim to facilitate delivery of the Government's strategy by supporting ambitious and innovative transport projects that will increase productivity and reduce congestion, as we are doing for urban areas through the Transforming Cities Fund. We also want to build on the transformational investment being delivered through RIS1, and on the ideas set out in Highways England's Strategic Economic Growth Plan, *The Road to Growth*.[11] We will seek to be responsive to development in areas as local industrial strategies are created, led by mayoral and combined authorities or LEPs. On the SRN, we will:

- Tackle congestion and improve the reliability of journeys, to help increase productivity.
- Invest in new corridors to improve service from the SRN and to support economic growth and support economic growth; reduce barriers to movement and cooperation; and help to support levelling up of the economy across the country.
- Better connect sites of high growth (for example Enterprise Zones and major developments) and around potential drivers of growth, including rail freight terminals and HS2 stations.

11 At: www.gov.uk/guidance/highways-england-supporting-growth

- Better connect ports and airports to support exporters and develop new business opportunities. This will be partly through major improvements, as we have done in RIS1 with the upgrade of the A14 between Cambridge and Huntingdon. The Port Infrastructure Fund has contributed £13 million to the development costs of further improvements that would improve access to ports in Dover, Felixstowe and Southampton. In addition, we will continue to work with local highway authorities to identify ways in which we can better manage the whole of these important routes to ports.
- Take into account the strategic importance to the economy of freight moved by road by supporting the specific needs of HGV traffic on the SRN, including consideration of the need for sufficient parking facilities.
- Continue linking geographically isolated rural areas and towns through the SRN and also the local highway authority operated MRN, so that communities are not left behind.

### Enterprise and skills

Highways England will operate in ways that support the Government's agenda for investing in skills and supporting small and medium sized enterprises, seeking innovation and using new technology. Highways England will work closely with its supply chain, and with academic and community organisations, to secure opportunities to boost skills, apprenticeships, graduate schemes, women in engineering, local businesses, and getting people into work.

Highways England will continue to collaborate with government, clients, and other interested parties to deliver the Transport Infrastructure Skills Strategy.[12]

## 2. A greener network

Road transport makes possible many important things in our lives: working, commuting, supplying the food and goods that we need, and accessing education, healthcare, and leisure. However, as the system has grown in the past, in many places it affects the environment, air quality, and communities surrounding it.

We recognise that the need to fix those negative impacts which also matter greatly to people and the combination of work being funded through RIS2 and wider government activity, will vastly improve the SRN's environmental performance.

### Tackling emissions

The Government has adopted one of the most ambitious plans in the world to decarbonise road transport. *The Road to Zero*[13] strategy set out a commitment to end the sale of new conventional petrol and diesel cars and vans by 2040 and steps to decarbonise freight. In February 2020, we launched a consultation on bringing this date forward to 2035, or earlier if a faster transition appears feasible. Other plans to improve the environmental performance of transport can be found in the Government's *Clean Air*,[14] *Clean Growth*[15] and nitrogen dioxide ($NO_2$) strategies[16].

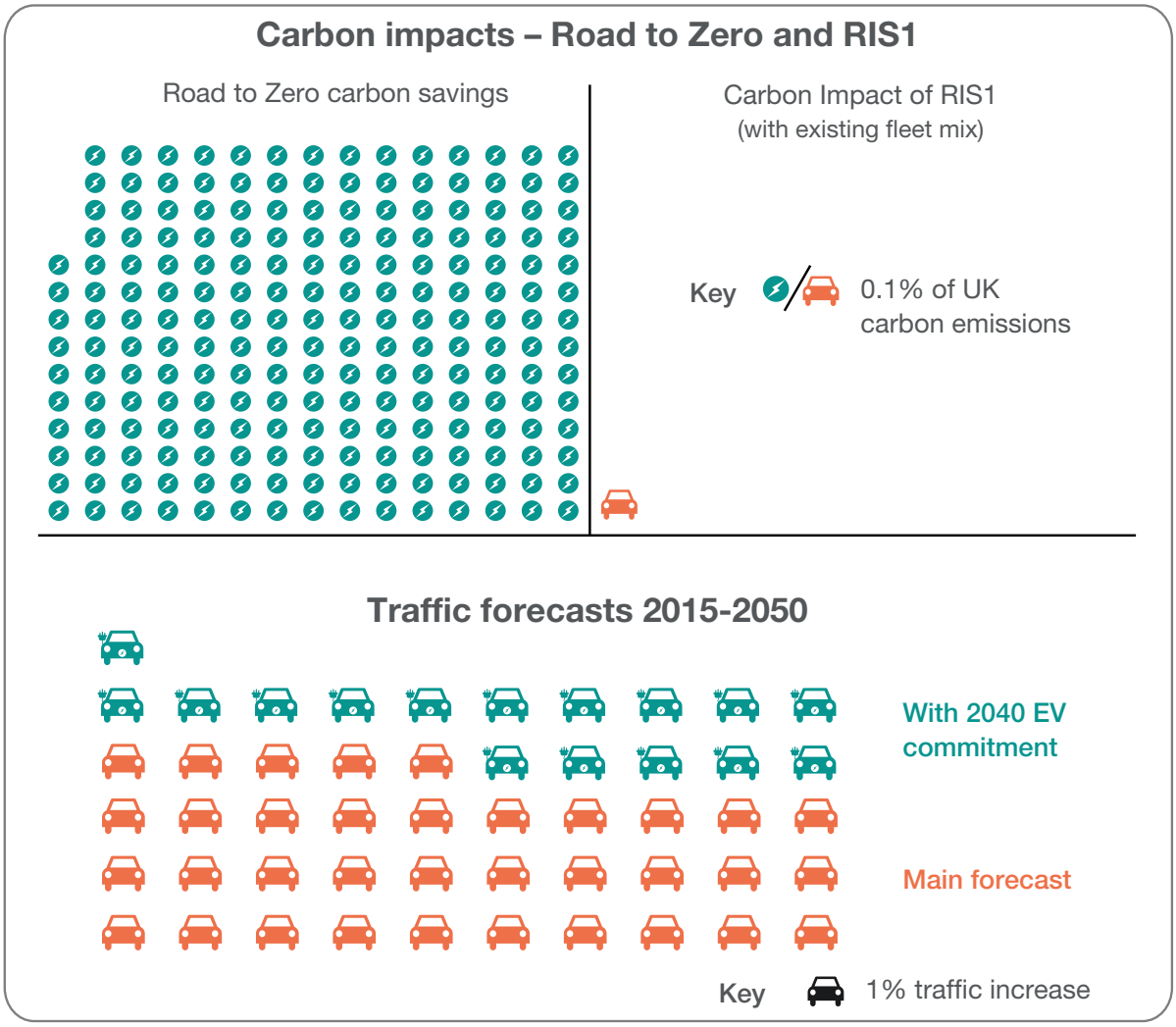
12 At: www.gov.uk/government/publications/transport-infrastructure-skills-strategy-three-years-of-progress
13 At: www.gov.uk/government/publications/reducing-emissions-from-road-transport-road-to-zero-strategy
14 At: www.gov.uk/government/publications/clean-air-strategy-2019
15 At: www.gov.uk/government/publications/clean-growth-strategy
16 At: www.gov.uk/government/publications/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2017

With transport accounting for a third of all UK greenhouse gas emissions, it is clear that all modes need to take urgent action to scale up their efforts to tackle climate change. The UK's first Transport Decarbonisation Plan, due to be completed later this year, will bring together a bold and ambitious programme of coordinated action needed to reach net zero emissions by 2050.

Achieving this will make our towns and cities better places to live, help to create new jobs and improve air quality and our health. Our *The Road to Zero* strategy put us on track to make substantial reductions in road transport emissions, but we now intend to go further and faster.

One of the associated benefits of this is that the costs of travel are expected to fall, as electric vehicles are cheaper to drive per-mile than their conventionally-fuelled equivalents.

One of the consequences of this, alongside transformational environmental improvements, is that there may be a greater incentive for people to drive. The effects of a 2040 changeover were modelled as part of



our latest road traffic forecast, and this showed that as conventionally fuelled vehicles were retired, we would expect to see a rise in traffic above other scenarios.

This is not to say that the decarbonisation of transport will lead to congestion. Our forecasts only show what would happen if all other factors surrounding transport remain equal, and the Government is committed to embracing many changes as part of the future of mobility.

Across England (outside London), we are investing £2.5 billion through the Transforming Cities Fund that seeks to improve intra-urban connectivity in city regions, and £5 billion to overhaul bus and cycle links. For bus users, this funding will support higher frequency bus services and bus prioritisation schemes as well as new zero emission buses. Cyclists can look forward to new high quality separated cycle routes and safe junctions.

We are also taking a range of other steps to support public transport, encourage shared travel and to make walking and cycling the default choice for many shorter journeys. The Department continues to invest in the National Cycle Network which already helps almost 4.5 million people make car-free journeys each year. But nevertheless, changes to the vehicle fleet mean that we should expect pressures on our roads to be higher than they would be if we did nothing to tackle climate change.

Overall, *The Road to Zero* strategy is the most ambitious plan the UK has ever had to improve the environmental performance of transport. Sensible investments in our SRN form a necessary and important ally to that plan. If we insist that the driver of 2050 is in a zero-emission vehicle, we also need to make sure the road network is ready to meet their needs. This is not a question of reverting to an outdated approach of predict and provide, but of modernising our whole transport network in a coordinated way that recognises and manages the pressures upon it, including the pressures on the roads.

In the coming years, the Department will prepare the SRN for a host of transformative policies that will deliver radically improved outcomes for the environment, including:

- Supporting the decarbonisation of freight, overcoming the particular difficulties associated with finding approaches to allow the freight sector to move away from diesel.
- Developing the UK as one of the world's leading hubs for zero-emission vehicles, both in terms of research and manufacturing.
- Tackling congestion hotspots – which cause emissions now and frustrations in the future if traffic rises above trend.
- Supporting the development of a network of rapid and higher powered chargepoints along the SRN.

Many of these steps have already been outlined as part of *The Road to Zero* and the Future of Mobility strategies published by the Government. RIS2 is a fully-integrated part of this wider effort to reach net zero emissions.

As a result of these measures, we also expect that all locations within within Highways England's control will meet air quality targets before the end of RIS2, and emissions of the key pollutants will keep falling.

### Improving the environment now

In addition to preparing for the future, there are environmental impacts that demand action now. RIS2 contains an ambitious and

fully-costed plan to manage and reduce the impacts of the SRN, and where we invest in the network we aim to make positive environmental improvements. Where impacts are unavoidable, we will minimise them. Over the years covered by RIS2, Highways England will increasingly mainstream environmental considerations across its everyday business activities and will continue to seek to exploit new thinking and technology to achieve more environmentally beneficial outcomes. This includes upholding statutory obligations relating to the protection of the environment and cultural assets, and

### Case study: A30 Chiverton to Carland Cross

The A30 is Cornwall's primary trunk road and connects the county to the motorway network via the M5 at Exeter. The route between Carland Cross and Chiverton Cross is the only single-carriageway stretch from the M5 to Camborne. This existing stretch passes close to a number of important environment and heritage areas; including a World Heritage Site, a Registered Park and Gardens and a number of Sites of Special Scientific Interest. One of the primary environmental concerns faced by the project is the risk of severance of species crossing through these areas.

*A green bridge over the A556 constructed during RP1*

As part of Highways England's commitment to better environmental outcomes, the A30 Chiverton to Carland Cross project team will be implementing initiatives to help ensure that the construction of the scheme does not harm the local environment, particularly the risk of severance. One of these initiatives is the construction of a 20 metre-wide 'green bridge'. This will serve as a both habitat and crossing for a huge variety of species whilst also enabling greater connectivity and biodiversity across the area as a result of the scheme.

Schemes such as this build on the environmental success of past projects, such as the A3 Hindhead and the A30 Goss Moor, to tackle the environmental damage of today's traffic.

playing an important role responding to wider government strategies.

A £345 million Environment and Wellbeing ring-fenced fund will invest in measures to improve environmental outcomes, including on air quality, biodiversity, flood risk, and retrofitting existing roads with modern environmental standards and green infrastructure solutions. And RIS2 makes clear how a sensitivity to the environment will run through all aspects of Highways England's work in delivering better outcomes for road users. For example:

- **Green Infrastructure**: Location-appropriate planting can improve biodiversity, mitigate emissions and reduce noise pollution, as well as helping infrastructure sit more sensitively in treasured landscapes.
- **Operations**: Support for cycling and public transport users will help people make more active and sustainable travel choices on our roads. Work to reduce congestion will help the network perform more smoothly and in turn reduce emissions from motor vehicles idling in traffic.
- **Investment**: We are ramping up spending on the operation, maintenance and renewal of the network, to bring the country's roads to a more modern, fit-for-purpose standard, and only adding capacity where it is needed to keep the network moving smoothly. In this work, environmental impacts will be avoided, mitigated against and minimised wherever possible.

All of this means that our ageing SRN will be primed to adapt to emerging technologies, and will be rejuvenated to improve outcomes for the environment.

The Government's *25 Year Environment Plan*[17] sets a vision that will embed an 'environmental net gain' principle for development, including infrastructure, and a 'natural capital' approach to making choices and long-term decisions, recognising the environment as an important economic asset.

The Plan also seeks to improve: the management of litter (an area where Highways England has both statutory obligations and those in the *Litter Strategy for England*[18]), noise and light pollution; water and air quality; the control of risks arising from surface water flooding; the condition of sites of special scientific interest; and the quantity and quality of green infrastructure. All these matters will require Highways England's input.

The environment has many facets. Specific actions in RIS2 will include:

- On reducing the impact of noise pollution, continue with the Noise Important Area improvement programme and consider the opportunities provided by new road surfaces and design of the soft estate, especially in sensitive areas such as National Parks and areas of high population density.
- On biodiversity, ensure no net loss across Highways England's activities in RP2 and continue progress towards the target of delivering a net gain in biodiversity by 2040. New planting will be appropriate to local habitats.

17 At: www.gov.uk/government/publications/25-year-environment-plan
18 At: www.gov.uk/government/publications/litter-strategy-for-england

- On air quality, work to identify and implement measures to address $NO_2$ exceedances on the SRN and supporting the work of local authorities to develop and implement their clean air plans, where there are interactions with the SRN.
- Address severance issues, (the negative effects arising from the way busy infrastructure routes can divide people, places and species because of their relative impermeability), both as part of the design of new schemes and through improvements where existing problems are severe.
- Continue to respect ancient woodlands and protected wildlife sites. Mitigations will be considered as part of scheme design, such as the translocation of trees and soil, wherever such areas are unavoidably affected.
- Ensure measures are put in place to address heritage assets at risk, or those negatively impacted by the SRN, whilst seeking to avoid and minimise harm to heritage assets, or put heritage assets at risk as a result of works to the SRN.
- Support efforts to tackle the shortage of lorry parking. This will help to remove the pressure of drivers to park inappropriately and the negative environmental consequences of fly-parking for local residents and drivers.

We will hold Highways England to account on its environmental performance with challenging targets. We will also continue the process of post-opening evaluation that confirms whether mitigation measures have been as effective as they are meant to be.

**Air Quality**
Ambition to eliminate all $NO_2$ links in exceedance during RP2, supported by the delivery of a programme of activity to eliminate those links in exceedance within Highways England's control. In addition, Highways England will investigate and assess incorporating into new and existing contracts air quality standards for supply chain vehicles.

**Highways England Carbon**
Highways England will reduce its carbon emissions (as a direct result of electricity, fuel use and their day-to-day operational activities) during RP2 (from 2021/22).

**Biodiversity**
No net loss of biodiversity from Highways England's activities, both from new schemes and its operational estate

**Noise**
7,500 households mitigated from excessive noise through a combination of barriers, targeted resurfacing to reduce road noise, and noise insulation for individual households

## 3. A safer and more reliable network

The SRN is a part of daily life for millions of people. When it works well, it enables people to get to where they need to be, and to do what they want to do. But every day, this requires Highways England to work hard to make sure that every journey is as safe and reliable as it can be.

This is the core of Highways England's operational business. Traffic Officer patrols work around the clock to resolve incidents and protect road users, while their colleagues in Highways England's regional control centres watch and manage the network minute-by-minute. At the same time, the longer-term decisions taken to upgrade the network must have at their core the ambition to reduce danger and improve journey quality. This affects the strategy and the design philosophy that influences longer-term design and planning.

Increased transparency will be important in driving improved performance here. Much of the data used in monitoring and reporting on Highways England's performance originates within the organisation. This data is currently provided at an aggregated level, but with some limited granularity providing additional detail in performance across regions which contributes to reported position.

ORR relies on regional data to gain greater insight into Highways England's performance. For example, its annual benchmarking report includes a range of comparisons across Highways England's regions using such data. Over time we want Highways England to publish more regional data and expect it to work with ORR to do so.

The scale of Highways England means that it is a natural leader in innovation of contract management, asset management, network operation, and construction techniques. It already sets standards for highways assets in the *Design Manual for Roads and Bridges*, and is the competent authority in technical matters for roads. Its work on innovation will continue to be supported by a designated fund in RP2.

Given the potential to achieve significant benefits for road users and taxpayers from the exploration and adoption of modern and innovative working practices, and for establishing the UK's position as an innovation hub, it is important that Highways England shares what it learns. Its procurement frameworks already encourage innovation sharing by the supply chain, and we expect Highways England to share innovative practices, and the lessons learnt from early adoption of those measures, with local highways authorities.

### Safety

Safety is the first responsibility for both the Department and Highways England, informing all aspects of our strategic vision for the SRN. The approach to safety is based on the 'Safe System' approach to road safety management,[19] which recognises that people will make mistakes which can lead to collisions. The safe system approach looks to first prevent these mistakes from occurring and, where they do, to prevent the severity of any injuries through a holistic package of inter-related activities covering safer roads, safer people, safer vehicles and post-collision response.

19 Adopted in England as part of the British Road Safety Statement at: www.gov.uk/government/publications/road-safety-statement-working-together-to-build-a-safer-road-system

We will continue towards the goal of 'Zero Harm', aiming to bring the number of people killed or seriously injured on the SRN to a level approaching zero by 2040. As mentioned earlier, technology will be an important factor in achieving this vision, but there are other measures that can help, some more achievable in the short-term. Highways England will deliver a safety programme that secures improvements beyond business as usual, for example by:

- Achieving a better understanding of the causes of collisions through improved investigation and the use of data.
- Continuing to invest creating a forgiving network, whose design anticipates and accommodates human error, through our major planned investments and targeted improvement programmes at high risk locations. This includes applying the findings of the of the of the smart motorway stocktake.
- Using the new small schemes fund to support safety measures at known collision hotspots.
- Enhancing all-weather resilience of the SRN, to minimise the risk of incidents and their impact for road users.
- Supporting users who are affected by an incident and implementing measures that enable them to continue their journey.
- Working with partners to improve driver behaviour and reduce risky behaviours which may lead to incidents, including through engagement and education activities.
- Providing improved facilities for non-motorised road users through the provision of infrastructure separated from motorised traffic and safe and direct crossing facilities over the SRN, in particular where layouts require the use of the SRN for short distances to access rights of way on either side of the road.

- Providing better information to customers during their journeys on potential hazards and the need for speed compliance.
- Focusing on high-risk groups and identify what further measures could reduce their likelihood of incidents, i.e. motorcyclists, new and older drivers.
- Addressing safety of its staff and those of contractors working on the SRN.
- Supporting the activities of partner organisations such as the driver and vehicle agencies and the police to improve vehicle safety and compliance, i.e. vehicle checks.
- Working with organisations like the Samaritans to determine what steps can be taken to minimise suicide attempts on the SRN.

### Reliable and resilient

Highways England, as steward of the SRN, is responsible for the effective operation, maintenance and renewal of the network. While government does not seek to specify how Highways England should approach these matters in a RIS, effective maintenance through the use of proven management techniques such as Lean, reduces costs and delays, and provides users with more reliable journeys.

Changes in climate are forecast to bring greater challenges to the network, which will need to be able to cope with a wider range of climactic conditions and extreme weather events. The National Infrastructure Commission is examining the resilience of the UK's infrastructure currently, and is expected to provide recommendations in spring 2020 which will inform future thinking in this area.

In RP2, Highways England will continue to improve road condition and:

- Proactively address maintenance problems, so that those emerging on vulnerable sections of the network can be resolved before they inconvenience users.
- Use Lean techniques to manage programmes of work and operations processes, improving efficiency of delivery.
- Consider the whole life impacts of decisions on the maintenance of road infrastructure and the soft estate, where faults are found, balancing potential increased initial costs of maintenance with reductions in repairs that disrupt traffic and cost more in the long-term.
- Use new technology to bring down maintenance costs, for example through the use of drones and self-healing roads. Opportunities in this area can be tested through the Innovation and Modernisation designated fund.
- Take on greater responsibility for the content of Variable Message Signs, which provide roadside communications, to better inform road users.
- Continue to provide traffic officers for motorways, with a focus on the most congested parts of the SRN.
- Improve their effectiveness in keeping roads open during bad weather and, working with partners including the Environment Agency, prepare the network so that it is able to withstand more extreme weather conditions and flooding.

- Protect network resilience by better understanding the asset and making more use of data; and encourage effective use of that data to provide the information about their journey that users need.

We will measure the condition of the network through users' experience of ride quality, as well as more conventional measures of asset status.

## Designing wisely

By their nature, journeys on the SRN will often be long-distance. The network needs to be designed accordingly, addressing in a consistent way safety, reliability, and users' experience both when traffic is flowing well and when there is disruption. Its design also needs to take into account the SRN's relationship with other roads and modes, enabling seamless integration for users, and with the wider environment, encompassing natural, human and built environmental factors.

Infrastructure design must always be respectful of place, and where roads pass through areas of substantial environmental and cultural value, design work must take extra care to incorporate the road and roadside furniture sensitively into the landscape, potentially using a wider footprint for tree-planting, landscaping and the like. Highways England's ten principles of good road design[20] provide a useful framework which should guide design work in specific locations, responding appropriately to the local context. Highways England's Strategic Design Panel will continue to provide both

20 At: www.gov.uk/government/publications/the-road-to-good-design-highways-englands-design-vision-and-principles

general advice and independent design reviews of individual Highways England projects.

Yet, there are some general ambitions that should, over time, be applied across the SRN reflecting its principal purposes. Consistency of standards can benefit users, both when using the road and when planning journeys. Where practicable within environmental, affordability and value for money constraints, and working with partners, our vision is for the SRN to develop progressively to reflect eleven ideals.

Given that free-flowing networks are crucial for the long-term health of the economy, it is important to protect the long-term health of the SRN. This is particularly relevant in the provision of new junctions, where a poorly-placed connection can hinder other users. Therefore, we will consider proposals for new junctions on the SRN that open up new areas for housing or commercial development in

conjunction with local roads where these can demonstrate that they would not adversely affect the safety, predictability or reliability of journeys on the SRN. Where this is not possible, we will expect Highways England to work with local partners to find alternative ways of providing high quality access to the SRN through existing connections, and look to leverage third-party investment for such work.

## Road standards

There are two principal road standards operated by Highways England: motorway and all-purpose trunk road (APTR). It is important that drivers remain clear and confident about the rules that apply on the roads that they use. Consequently, we do not intend to create additional standards with separate branding, signs or rules that have the potential to confuse or overload drivers.

Within these two standards, Highways England has defined specific sub-products with their own technical definitions. These include smart motorways and expressways.[21] Defining products in this way is helpful for decision-makers, procurers and suppliers, but it is not necessary for road users. As more roads are upgraded to improved standards more users will simply experience the benefits they bring in an easy and intuitive way.

Where it offers benefits to road users and the wider community, some APTR routes may be upgraded appropriately to operate as motorways. No APTR will have motorway restrictions applied until there is a good quality alternative route in place for non-motorised users and slow vehicles. The design of these alternative routes will reflect local needs, but a set of general principles will be developed in association with representative user groups.

## Smart motorways

The safety of our roads is of paramount importance, and it is also important that people who use our roads feel safe and confident in how to use them. In 2019, the Department commissioned an evidence stocktake to gather the facts on the safety of smart motorways and make recommendations.

The stocktake is expected to conclude shortly. Highways England will need to deliver its recommendations and assess what they mean for the delivery of enhancement projects involving smart motorways that had been included in the RIS1 investment plan or recommended for future development.

## Geographic extent

The Department has been working with Highways England to explore possible changes to the geographic extent of the SRN so that the network's shape better matches its purpose as outlined earlier.

Our thinking has been informed by the Department's public consultations on the SRN Initial Report and MRN proposals, research commissioned by Highways England, and recommendations from on-the-ground operations staff. In particular, we have focused on changes that would:

- Connect more of England's principal international gateways directly to the SRN by trunking the 'last mile' to the entrance to remove variability of service experience for users.

21 The technical definition for expressways (GD300) was published in May 2019 at: www.standardsforhighways.co.uk/ha/standards/dmrb/vol0/section2.htm

- Ensure the largest conurbations in England are served by the SRN so they can benefit from high quality connections into the national network.

We are currently in discussion with the relevant local highway authorities and Highways England with a view to making some changes during RP2. In all cases this will require agreement about the precise extent of the change, and the completion of assessments of road condition, drainage, and so forth so that the receiving authorities are aware of the detailed nature of the assets they are gaining before we can proceed with the statutory processes. These are:

- Trunking: The A453 from the M1 to East Midlands Airport (the UK's second-busiest airport for freight traffic), and the A13/A1014 from the end of the trunked A13 through to the recently-opened London Gateway Port, with a view to transfer to Highways England.
- Detrunking: The A585 from the M55 to Fleetwood, following completion of its RIS1 improvement project, the A40 from the Gloucester Ring Road to Boxbush, and the NEC Eastway, with a view to transferring these roads to Lancashire County Council, Gloucestershire County Council and Solihull Metropolitan Borough Council respectively.

Other discussions with local highway authorities are at an earlier stage, including potentially trunking the M65 between Junctions 10 and 14 pending the findings of the Central Pennines study described later. We will explore these and further changes to the extent of the network that could be implemented for the start of RP3. For example, we recognise that the plans for the Lower Thames Crossing will have an impact on the road networks of Kent and Essex and we will consider what that means for the shape of the SRN in those areas.

As mayoral and combined authorities develop strategies and working arrangements for their transport and environmental activities in many of our urban centres, an important question emerges about how the SRN and Highways England can play their part most effectively in those places. In RP2, Highways England will undertake a study into the role of the urban SRN, balancing the desire to better integrate these roads with local planning and transport operations while not adversely impacting on their national strategic role. This study will consider options such as improved collaboration on operations and changes in road ownership.

Also during RP2, the Department and Highways England intend to make use of data to identify locations where long-distance journeys regularly use local roads to connect parts of the SRN. In addition, Highways England will consider making minor alterations to the network's boundary at a location-specific level to improve the operation and maintenance of junctions and connections in and out of service areas. In both cases changes should minimise the number of ownership boundaries crossed by users, with a view to achieving smoother, more reliable journeys.

## 4. A more integrated network

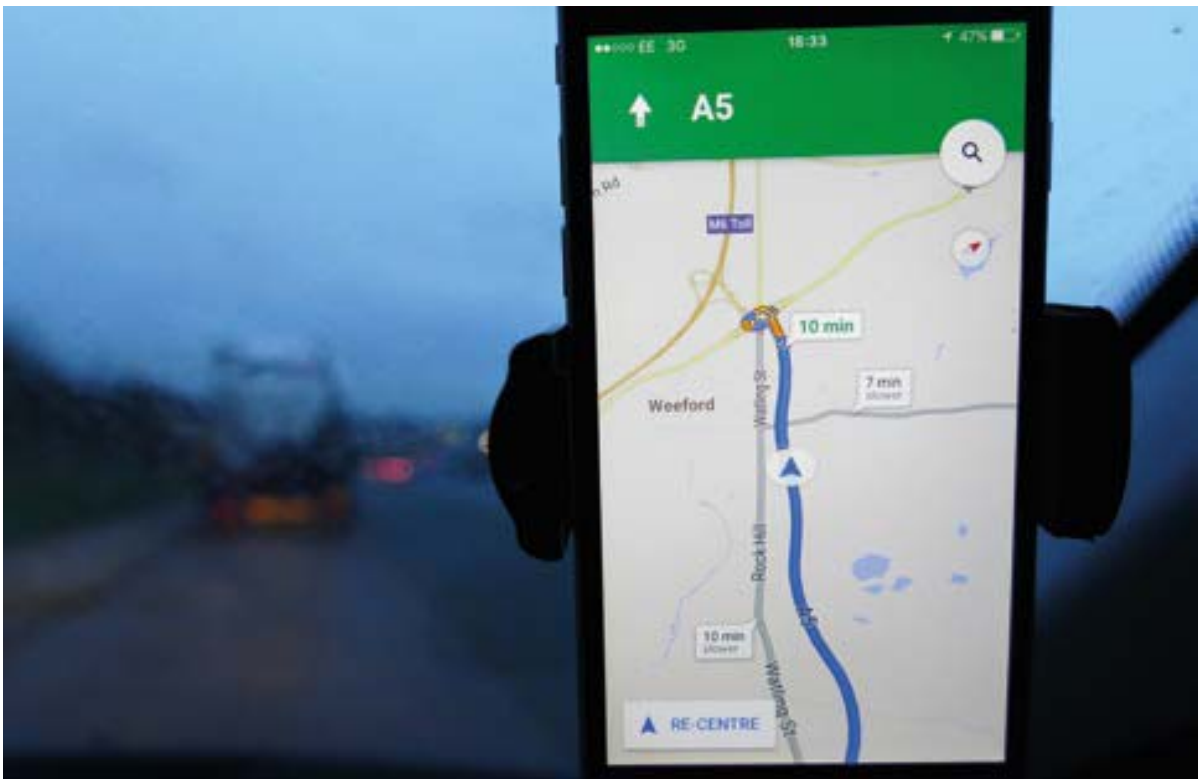
The SRN is a vital part of the wider transport network. More than two-thirds of all HGV traffic travels on the SRN and three times as much freight is moved by road than by rail and water combined. 95% of people living in England travel on the SRN at least once a year. But it is not the right network for all transport needs: it needs to be designed and operated to draw on its strengths and be well

connected into other roads and modes that can better meet other transport needs, including urban journeys and international travel. And, of course, very few journeys start or end on the SRN.

Highways England is already working with local highway authorities, Network Rail and bus and coach companies to improve integration by developing closer working arrangements and sharing data. This is especially important for day-to-day operations where problems on one mode can quickly spill over to affect the performance of another, and for planning future roadworks and managing diversion routes that minimise impacts on road users and local communities. There are also opportunities to reduce demand for the SRN by collaborating on the provision of local and active transport options. In relation to the local planning process, Highways England will continue to discharge its statutory role.

We expect these relationships to continue to develop. Through RIS2 and Highways England's activities, as well as via other mechanisms and partners, we will:

- Ensure the SRN is fit-for-purpose for long-distance traffic, and where possible provide alternatives for local traffic that can reduce the pressure on the SRN. This could include supporting local road improvements and public transport in places where the SRN is already under heavy pressure.
- Strengthen the resilience of the whole transport network, seeking to reduce situations where people are dependent on a single SRN link, and instead find other transport options, whether other roads or modes, to address this.



  - At the biggest scale, this will be dealt with by working with STBs, which can take a fully multi-network perspective across a large area. This would suit the toughest transport problems, building on the approach we have taken in RP1 looking at the M60 north-west quadrant and M25 south-west quadrant.
  - For smaller, location-specific enhancements, this may mean investing off the SRN as is being done in Glossop; and it may mean putting money into things like park and ride facilities where this will lead to demonstrable benefits for motorists.

- Help people consider their transport choices or need to travel through use of data and journey information, for example car-share schemes, promotion of public transport alternatives and fast broadband.
- Make good quality connections with the local road network, and support for local authorities, more central to the operations of Highways England, with some aspects of performance accountable to ORR.
- Support growth, by both improving connections between regions, for example by dualling the A66, and helping areas meet their growth potential, for example the A46 corridor.
- Aid modal integration at our most important ports, airports, and rail terminals, through a policy of trunking roads to their boundary wherever practical. We will also help improve integration by including major related works within RP2 (for example upgrades at rail freight interchanges) subject to the developer's funding of works. We will also ensure that the SRN and work on it integrates well with the design, construction and operation of HS2 and other transport projects.
- Review the geographic extent of the SRN as part of the process for setting each RIS, and seek to agree alterations with the relevant local highway authorities, to: reflect changing economic, social and demographic patterns; ensure the SRN continues to meet its principal purpose; and improve the experience of those using those roads.

### Meeting the specific needs of user groups

In line with the principal purpose of the SRN, many of our ambitions seek to focus the SRN's design to better accommodate the needs of motorised users, recognising that these are the vast majority of users overall. However, this is not at the expense of other road users such as cyclists, and we also recognise that different groups of people using motor vehicles have particular priorities which we aim to address.

### Freight and logistics

Freight logistics businesses depend on the SRN working effectively, and their ability to move goods efficiently is vital to the country's economy. Therefore, they are important customers for Highways England and its engagement with the sector will be strengthened so that it understands the sector's needs and is ready to respond. This will be crucial to building confidence, as evidenced in Transport Focus's *Logistics and Coach Manager Survey*.[22]

22 At: www.transportfocus.org.uk/research-publications/publications/logistics-coach-manager-survey-englands-strategic-roads/

The sector benefits from our investment to support reliable, predictable journeys and improved provision of travel information for all users. There are additional, specific needs for the operators and drivers of HGVs employed by the sector, for example: the provision of sufficient and optimally-located parking and rest facilities; approved diversion routes that can accommodate their vehicles; and making available Highways England data that can help freight operators schedule their journeys better. Highways England will expand its work with the sector through RP2 to address these challenges, in conjunction with the private sector.

### Disabled users

The private car is vital for many disabled people: it enables a level of freedom and independence that is greatly valued. Transport Focus research into the experiences of disabled drivers and passengers using the SRN found that, when driving, disabled people felt temporarily 'non-disabled'. [23] In other words, that societal barriers had been removed and that they had what they needed to travel where they wanted. This level of accessibility is an objective for roads and other transport modes in the Government's *Inclusive Transport Strategy*.[24]

For disabled users, rest breaks are especially important to avoid fatigue and the need, of some, to access toilet facilities on a regular basis. We recognise the importance of making sure these facilities are present and accessible for disabled users so they can have a positive experience on the SRN.

We have already provided £2 million funding to improve the provision of facilities at motorway service areas. Highways England will work with partner organisations to ensure that the needs of disabled users are incorporated into our thinking about managing operations and roadworks to improve their overall journey experience.

### Public transport users

Coach and bus passengers will benefit from safer, smoother journeys in the same way as drivers or car passengers. However, they will have specific requirements at the points where they board or alight, which may sometimes be on the SRN or connected to it (for example a service area). Transport Focus has recently published some research on the needs of bus passengers, which should inform future thinking in this area.[25] Highways England, working in collaboration with local authorities and service providers, will:

- Help bus and coach companies offer efficient, attractive services by smoothing access to and from the SRN.
- Where they remain on the SRN, seek to make bus passenger facilities safe and accessible, with appropriate footpaths, lighting and design features, for example provision for users to cross the road nearby.
- Consider park and ride or park and share facilities at junctions near urban centres to help reduce traffic flow in major towns and cities.

23 At: www.transportfocus.org.uk/research-publications/publications/accessible-road-network-disabled-user-experience-englands-motorways-major-roads/
24 At: www.gov.uk/government/publications/inclusive-transport-strategy
25 At: www.transportfocus.org.uk/research-publications/publications/buses-on-highway-englands-roads-meeting-the-needs-of-passengers-and-bus-companies/

### Cyclists, pedestrians and equestrians

The Department and Highways England take the needs of cyclists, pedestrians and equestrians (non-motorised users) seriously. Encouraging people to opt for active modes of travel is both an effective means of reducing congestion on our roads and offers health benefits for all by improving air quality and developing fitness. This is particularly welcome at a time when there are growing demands on both our transport and health services. Easing these pressures will benefit both communities and the economy: it offers major benefits through connecting communities and making street environments more liveable and attractive.

The Department's *Cycling and Walking Investment Strategy*[26] and Cycling and Walking Safety Review highlight the importance placed on making these modes of travel more attractive for people so they become the first choice for short journeys. Transport Focus research has identified the priorities of non-motorised users and recommended steps that can help the network better meet their needs.[27]

Investment in the SRN can support this agenda by improving cycling and walking provision along trunk 'A' roads, and reducing severance effects where local cycling and walking routes cross the SRN or are separated completely by it. Together with the Department's new future of mobility strategy, they are designed to promote mode shift and assist the transition to a greener and cleaner society.

The designated funds will enable Highways England to continue investing in making the SRN more accessible for non-motorised users. They will work with local highway authorities and other off-road network providers to deliver seamless connections for non-motorised users between paths and routes, including and especially where MRN and Large Local Major investments result in improved local infrastructure adjoining the SRN.

In the long-term, our vision will mean that non-motorised users will be able to access good quality routes for their journeys segregated from an SRN that primarily serves long-distance, higher speed traffic. Provision for these users will be considered in plans for enhancements and major renewals to the network from the start, ensuring that all current users of the SRN benefit from investments.

In the immediate future, non-motorised users will in many places continue to share the same all-purpose trunk roads as other road users. While this remains the case, Highways England will:

- Maintain routes and facilities for non-motorised users to be high quality, safe and direct.
- Make targeted improvements at problem locations, for example at junctions or other locations where there is a need to address safety issues, or where non-motorised users are required to use the SRN for short distances to access rights of way on either side of the road.

## 5. A smarter network

As we seek to make the SRN work better to meet today's demands, we also need to make

26 At: www.gov.uk/government/publications/cycling-and-walking-investment-strategy
27 At: www.transportfocus.org.uk/research-publications/publications/cyclists-pedestrians-equestrians-summary-priorities-highways-englands-network/

allowance for the range of ways in which road users and their vehicles may interact with the SRN infrastructure in the future. We have an opportunity to lead the world in responding to this technological progress.

Highway's England's *Connecting the Country*[28] report and our *Technology and RIS2* discussion paper[29] have examined the technology and data trends that could transform the roads sector and help us address the challenges brought by increasing demand and the drive to have a more positive environmental impact.

In our *Industrial Strategy*[30] we have identified the Future of Mobility as one of four Grand Challenges that will prepare us to prosper in the modern global economy. Managing this potentially disruptive change effectively can allow us to maximise the benefits for people's quality of life and our economic productivity, whilst consolidating our leading role in the global industries of the future. For example, more intelligent vehicles and infrastructure open up the possibility for achieving much safer conditions for drivers, passengers and maintenance workers.

Highways England and the Department have commissioned a discovery project to consider the user need for data exchange between the SRN and the local road network. The areas of focus include formalising communications arrangements, improving transport and planning data and system integration to enhance network operation and incident and event management, and the requirements for ensuring the highway network is digitised and enables seamless use of CAVs.

We believe that regulations must be shaped in ways that actively encourage innovation, and Highways England will need to play its part in this rapidly-developing environment to ensure that the SRN is ready to support new forms of mobility. The Government has published its future of urban mobility strategy which sets out the guiding principles for how we will respond to emerging technologies and business models.[31]

The technology which will drive these changes is still developing, and the future is uncertain. It is still too early to say exactly how Highways England's role will evolve,

### A2M2 Connected Corridor

We have built and operated a connected corridor that delivers trial services that demonstrate the possible benefits that could be unlocked with larger scale deployment of digital roads and which work with UK and other countries equipped vehicles. As well as learning about possible impacts, we have also gathered evidence about user perceptions and how to improve technical delivery.

Through this work we have demonstrated the potential for 20% or more journey time improvements in some scenarios, and improved flows possible even with less than 10% of fleet connected to infrastructure.

28 At: www.gov.uk/government/publications/highways-englands-strategic-road-network-initial-report
29 At: www.gov.uk/government/publications/technology-and-ris2
30 At: www.gov.uk/government/publications/industrial-strategy-building-a-britain-fit-for-the-future
31 At: www.gov.uk/government/publications/future-of-mobility-urban-strategy

whether it becomes even more involved in system operations for example. But it is not too early to prepare and plan, on the basis that technology will become a more integral part of driving during RP2 and beyond. Therefore, through RIS2:

- Highways England is empowered to develop the infrastructure standards of the connected and autonomous era, by identifying how new technology can be effectively rolled out across the network in a way that is both safe and speedy. This is likely to include:
  - Working with vehicle manufacturers to create the right flows of data and information to and from CAVs.
  - Ensuring motorways are suitable for regular use by automated vehicles to meet government's wider policy objectives.
  - Ensuring trunk 'A' roads are suitable for regular use by automated vehicles without the need for major upgrades to their physical infrastructure.
  - Creating guidance or standards that local authorities can use to bring autonomy to their network.
- Highways England will continue with existing provision of data, and ensure an open architecture that allows software developers to provide users with new services.
- Recognising that network management will become more important, we will evolve Highways England's performance specification to start considering efficient management in controlled conditions, such as smart motorways and roadworks, as a prelude to the sorts of work that may be important in the future.
- We will continue to invest in connectivity, for example:
  - Highways England will continue fitting cabling alongside its network with capacity for future needs.
  - Depending on the lessons of the 5G West Midlands study, we may look to take work forward with private operators to bring 5G connectivity to the motorway network.
- In terms of other specific adaptation, we will not attempt to pre-judge the winning technology now. The continuing Innovation and Modernisation designated fund will be a stimulus for identifying technologies that are essential that can then be rolled out as part of ordinary business. Continued research and trialling will ensure that the UK remains ready to adopt cutting edge technology.

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# Part 2
# Performance Specification

**This performance specification sets out the Government's high-level expectations for Highways England and the SRN during RP2.**

**It draws on specific aspects of the Government's long-term vision for the road network and how it supports mobility and the economy, safety, and the environment. Highway's England's Connecting the Country report reflects many of these themes in considering how the SRN might evolve, and what this could mean for road users and the country's economy.**

**The performance specification also identifies where there is a need to develop improved measures of performance for future road periods.**

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# a. Overview

The performance specification is focused on, and designed to emphasise, the needs of those who use and rely on roads, and who live and work near the network. We have six outcome areas, which we set out in the Draft RIS, upon which we require Highways England to focus:

- Improving safety for all;
- Fast and reliable journeys;
- A well maintained and resilient network;
- Being environmentally responsible;
- Meeting the needs of all users;
- Achieving real efficiency.

Rather than setting out how Highways England should deliver the performance specification, we want it to work in the most effective way possible, delivering value for money and taking the actions that it deems necessary to achieve our long-term aims and balanced outcomes across the six outcome areas detailed above. The performance specification is itself part of a wider Performance Framework, which includes the delivery of the enhancement schemes, maintenance and renewals set out in the RIS2 investment plan.

We expect Highways England to align its final Strategic Business Plan and Delivery Plan with these expectations, and embed the performance metrics across its business units. ORR will monitor Highways England's compliance with the Performance Specification, and will hold it to account for its delivery.

We have set out seven principles for developing the performance specification, using ORR's experience of RIS1 monitoring, the development of the overall framework for Network Rail in Control Period 6, and the approach taken in other sectors. These principles have been used to develop the metrics. Some metrics do not meet all these principles completely, but attempt to strike a balance between them, for example metrics where Highways England has a lesser degree of control but are of high importance to road users.

| Principle | Definition |
|---|---|
| **Realistic, yet challenging** | Targets are challenging but achievable, and are based on evidence (see next point). |
| **Evidence based** | There is evidence that we're focusing on the right things and that both government and customers value what we are prioritising. There is evidence to determine the value of the outcomes being measured. |
| **Control and influence** | Outcomes and associated measures can be influenced by Highways England. Highways England are unlikely to have complete influence over all outcomes and measures, but this should not preclude their inclusion in the performance specification. Measures incentivise the right behaviours by Highways England. |
| **Measurable** | The outcome can be measured either directly or indirectly by the indicator. Measures follow good practice: they are SMART,[32] meaningful and directly relevant to the outcome area they need to measure. The data source is reliable and robust and has been analytically assured. |
| **Forward looking (future-proof)** | Outcomes and measures should largely stand the test of time and be relevant throughout a RIS period. A clear plan should be in place to replace measures which could be improved, or to be removed where there is evidence that there is little value in them continuing in the specification. |
| **Aligns with what customers and government want** | Customers recognise the outcomes as their priorities: they are written in a way that can be understood by them and which they have confidence in. Priorities will differ between user groups. For example, drivers prioritise journey time; vulnerable users, safety; and logistics, businesses reliability. Outcomes align with the Government's vision for the network and wider objectives, for example reducing carbon dioxide emissions and achieving value for money. |
| **Accessibility** | It is important that stakeholders are able to understand and engage with the metrics that are published. This can include the process used to reach them. |

32 Specific, Measurable, Achievable, Relevant and Time-bound.

# b. Measuring success

In each outcome area, the performance of Highways England and the SRN will be assessed against:

- Key Performance Indicators (KPIs);
- Performance Indicators (PIs); and
- Commitments that will provide additional context to Highways England's performance or help develop future performance measures.

## Key Performance Indicators

KPIs focus on activities or outcomes which are seen as most important, either by road users or communities that live near to the SRN, or which support wider government objectives. For each outcome area, there are a small number of KPIs. This ensures that Highways England can optimise performance through its investment plans, and its operational priorities for the network.

Most KPIs measure outputs where Highways England has a high degree of control; however, for some Highways England has less direct influence. An example is the KPI for the Improving Safety for All outcome area, which measures the number of people killed or seriously injured on the SRN each year. Highways England can influence safety on its network through how it maintains the condition of the roads, the way it manages roadwork and deals with incidents, and the design standards to which roads are built and maintained. But it has limited influence on driver behaviour and traffic demand levels, and none over factors such as vehicle design.

KPIs have targets attached to them and ORR will monitor Highways England's performance against these. Where targets are set for a metric over which Highways England has limited control, ORR will look at Highways England's performance in the round and whether it has taken appropriate steps in influencing components of the metric where it does have control.

## Performance Indicators

The KPIs by themselves do not, and cannot, fully reflect how Highways England and the SRN are performing. PIs offer trend-based measures to customers and stakeholders, and provide additional context to KPIs or cover areas of specific focus to inform ORR's monitoring. Performance on KPIs and PIs will be reported to ORR and Highways England will publish the data annually.

## Commitments

This covers other priorities which are not suited to metrics. For example, commitments to develop new metrics for future road periods; publish annual reporting on specific aspects of performance; or put in place the building blocks for improved performance and reporting transparency in the future.

Where these are not actions to be delivered in the first year of RP2, we require that progress in delivering these commitments is reported annually to ORR. Highways England should clearly set out its delivery timetable for any new metrics, along with interim milestones, so that progress can be monitored.

The Department for Transport may choose to replace or supplement an existing KPI, or PI, with a newly developed metric during RP2 or wait to include it in the RIS for RP3 depending on the time needed to establish it. In the event that the Department, Highways England or ORR wishes to change or add a KPI, PI, or Commitment, this will need to be agreed through a process of change control.

## Disaggregated reporting of performance metrics

Producing performance metrics in a disaggregated form, for example at a regional or corridor level can help assess Highways England's performance and efficiency and identify opportunities for improvement. Some regional reporting has been developed during RP1. The Strategic Roads User Survey (SRUS) accessed through Transport Focus's data hub provides road user satisfaction by region and by individual road.[33]

ORR publishes an annual benchmarking report[34] which assesses regional performance of five metrics against Highways England's performance specification targets. During RP2 we want to see further development and use of disaggregated reporting. Where this is possible, regional data and comparative performance data by road type will be provided for information and to support benchmarking. As with new metric development, this should be clearly set out in a delivery timetable by Highways England.

33 At: transportfocusdatahub.org.uk/

34 At: www.ORR.gov.uk/highways-monitor/publications/benchmarking-highways-englands-performance-and-efficiency

## Performance specification coverage

The performance specification is intended to represent the performance of England's SRN. But where roads are currently covered by Design, Build, Finance and Operate (DBFO) contracts, some metrics – in particular asset condition and litter – are not captured by the performance data reported to ORR, as performance reporting is part of long-standing contracts with different reporting arrangements.

During RP2 we want to see Highways England investigate including DBFO roads more fully within the performance specification for future road periods. Some DBFO roads, including parts of the M40 and A1(M), will come under Highways England control and reporting during RP3 as contracts come to the end of their life. For these roads, Highways England will naturally start collecting data in good time and ensure that those roads coming into the scope of performance reporting do so seamlessly. Other roads, such as the M25 will remain as DBFO, with the last of these coming under Highways England control in 2039-40. Highways England will investigate the cost and practicality of addressing inconsistent reporting for DBFOs with a longer lifespan.

## Data quality

The quality of data produced by Highways England is important in monitoring operational and financial aspects of the performance specification and the delivery of the investment plan. In many cases, the Department and ORR are reliant on this data to undertake its client management and monitoring activities. Highways England itself also needs good quality data that it can rely on to support management decision making.

We want Highways England to continue to maintain progress on improving data in RP2 to support metric development, and collaborate with ORR as part of ongoing work to improve the understanding of existing data and identify opportunities for improvement, including embedding lessons from RP1.

## Operating the performance regime

We intend to continue to use broadly the same governance framework as was developed for RIS1. This has allowed Highways England's performance to be assessed, and provided the sanctions and incentives to encourage the right behaviours. Nevertheless, we will look for opportunities to review and improve the current arrangements where appropriate. This framework includes ORR and Transport Focus as well as Highways England and the Department. As the parties have different roles, for example monitoring performance or assessing customer satisfaction, a high level of collaboration between all four will be required.

The work of ORR and Transport Focus has been important in developing the performance specification for RIS2. In addition to providing insight into what road users want (*Measuring performance of England's strategic roads: what users want),*[35] joint work by ORR and Transport

35 At: www.transportfocus.org.uk/research-publications/publications/measuring-performance-englands-strategic-roads-users-want/

Focus has guided the focus of the performance specification[36] for a future road period.

Through its Efficiency Review, ORR has provided advice on whether the outcomes sought through the performance specification are achievable based on the funding available and the profile and balance of the investment plan, and whether Highways England's proposals deliver these outcomes in an efficient manner.

Transport Focus will continue to gather the views of all road users and use these to formulate advice for the Secretary of State, as well as assisting ORR in assessing the performance of Highways England during RP2.

We require Highways England to collect data to report on the KPIs and PIs and to evaluate the extent to which its activities have driven changes in performance. ORR will continue to independently examine the efficiency and performance of Highways England, taking into account any analysis and supporting evidence provided.

ORR sets out how it monitors the operational and financial performance of Highways England through its Monitoring Framework document, which is currently being updated for RP2.[37] Transport Focus will also gather views of road users on performance to provide advice to the Secretary of State.

The rules on how the data relating to the KPIs and existing PIs will be gathered and analysed are set out in the *Operational Metrics Manual*[38] and *Efficiency and Inflation Monitoring Manual*.[39] Highways England will update and re-issue these shortly, following discussion and (where relevant) agreement with the Department, ORR and Transport Focus.

ORR has a range of tools to encourage and where necessary enforce compliance with the performance requirements of the RIS. Its enforcement policy is currently being updated in advance of RP2.[40]

In certain circumstances, the Department has the power to vary Highways England's statutory directions and guidance ("the Licence")[41], make statutory interventions, or change governance. We intend to consider whether the Licence requires any clarification amendments in the light of experience from the first five years of the arrangements established by the Roads Reform in 2014.

36 *Measuring Highways England's performance 2020-25: the road user view*, available at: www.transportfocus.org.uk/research-publications/publications/measuring-highways-englands-performance-2020-25-road-user-view/
37 At: orr.gov.uk/highways-monitor/road-consultations/all-road-consulations/monitoring-highways-england
38 At: www.gov.uk/government/publications/highways-england-operational-metrics-manual
39 At: www.gov.uk/government/publications/highways-england-efficiency-and-inflation-monitoring-manual
40 At: orr.gov.uk/highways-monitor/road-consultations/all-road-consulations/enforcement-policy-for-highways-england
41 At: www.gov.uk/government/publications/strategic-highways-company-licence

# c. Indicators and requirements

This part of the chapter sets out the KPIs and PIs that will be used to monitor and understand the overall performance of Highways England and the SRN, as well as the requirements made of it during RP2.

## Outcome 1: Improving safety for all

Safety of everyone who uses or interacts with the SRN is the first responsibility for both the Department and Highways England, informing all aspects of the design of RIS2. Highways England applies the "Safe System" approach to road safety management, which recognises that people will make mistakes which can lead to collisions. This approach looks to first prevent them from occurring and where they do to prevent injuries or minimise their severity through a holistic package of any injuries through a holistic package of inter-related activities covering safer roads, safer people, safer vehicles and post-collision response.

There has been a long-term downward trend in the number of people killed or seriously injured on the Network. However, as collision hot-spots are addressed, vehicles get safer, operating conditions on the road are more closely managed, and traffic levels on the SRN increase, opportunities to maintain this rate of progress get harder and as a result the rate of decline has slowed.

### Measuring success

Highways England's focus is on reducing fatalities and serious injuries on the SRN, and has a 'Zero Harm' goal of bringing the number of people killed or seriously injured to a level approaching zero by 2040. In RIS1 it has a KPI to reduce the number of people killed or seriously injured on the SRN by 40% by 2020, compared to the 2005-09 average baseline.

Reducing the number of people killed or seriously injured on the SRN will continue to be the lead safety KPI in RIS2, and the trajectory set for the next five years means Highways England remains on course for zero people killed or seriously injured by 2040. The target is therefore based on a 50% reduction against a 2005-09 average baseline, keeping Highways England broadly on the same trajectory as RIS1.

Highways England's activities and influences on performance will continue to concentrate on safer roads, safer people and safer vehicles. The Safety and Congestion designated fund will support specific smaller safety interventions, in addition to any safety benefits from schemes in the investment plan. However, we have also set a stretch element to the target, going beyond what can be achieved by these outputs alone, which continues to encourage Highways England to consider how every aspect of its business can improve safety for users. It must report against this target, including

variances to the trajectory, and evaluate and demonstrate how activities have contributed towards the outcome.

A supporting set of PIs will capture performance in relation to:

- the total number of people killed or injured on the SRN
- the number of non-motorised and motorcyclist users killed or injured on the SRN
- the number of injury collisions on the SRN
- the number of serious workplace injuries suffered by Highways England's employees and contractors.

During RP2, Highways England will work with Transport Focus to consider whether a rate-based measure of vulnerable road user casualties would provide a better measure of safety on the network for this group.

The safety rating of the SRN will also form part of the Improving Safety for All outcome area. Using the latest version of the International Road Assessment Programme (iRAP) model which has been developed to better reflect the SRN, Highways England will assess the network in 2021 determining a 'star rating' baseline and forecast for 2025 based on its investment plan. This assessment will provide an understanding of the level of use of the safest roads (3-star roads or above).

## Outcome 2: Providing fast and reliable journeys

Transport Focus's research into measuring performance of the SRN highlights that journey time is the most important influence on satisfaction among drivers according to its ongoing SRUS. It is often even more important to logistics and bus and coach businesses, as evidenced in Transport

| **Improving safety for all** | |
|---|---|
| **KPI** | ***The number of people killed or seriously injured on the SRN.***<br>**Target:** Ongoing reduction in the number of people killed or seriously injured on the SRN to support a decrease of at least 50% by the end of 2025 against the 2005-09 average baseline. |
| **PIs** | ● The total number of people killed or injured on the SRN.<br>● The number of non-motorised and motorcyclist users killed or injured on the SRN. Disaggregation will be provided by road user group to assist understanding of the PI, but are not considered PIs in their own right.<br>● The number of injury collisions on the SRN.<br>● The accident frequency rate for Highways England staff and supply chain staff based on RIDDOR[42] incidents and normalised by the number of hours worked in a year.<br>● The % of traffic using iRAP 3* or above rated roads. |
| **Commitments** | ● Work with Transport Focus to investigate a rate-based measure for non-motorised user casualties.<br>● iRAP baseline to be established in 2021, and 2025 forecast developed, based on latest iRAP methodology. |

42 Reporting of Injuries, Diseases and Dangerous Occurrences Regulations.

Focus's *Logistics and Coach Manager Survey*. In practice, and as highlighted in *Measuring performance of England's strategic roads: what users want*, journey time is viewed in different ways by users (which often blend together), and include actual journey time; arriving when you estimate you will; and not having wide variations day-to-day for the same journey.

Whilst journey time is heavily influenced by factors outside Highways England's control, such as traffic growth and extreme weather, we know from the SRUS that of the six key components of a journey that are measured, roadwork management scores most poorly. Highways England can and should work to tackle the congestion that can be predicted, such as cyclical increases in demand levels (for example, continuing to plan to avoid roadworks during peak periods, or at the start or end of holidays). It can also minimise disruption through planned roadworks by effective management that keeps traffic flowing smoothly.

Unpredictable congestion caused by, for example, incidents on the network may be more problematic, owing to their uncertain nature and impact on journey times. While such incidents may be outside the control of Highways England, how it deals with them can affect congestion and journey times.

## Measuring success

During RP1 so far, average delay on the SRN has grown from 8.9 seconds per vehicle mile to 9.5 seconds per vehicle mile. This is against the background of a growing economy, increasing traffic volumes, and a steadily increasing volume of roadworks taking place on the network as Highways England's investment on the network has risen, particularly schemes on existing lines of route such as smart motorways and major structures renewals. Network availability has remained consistently above its RIS1 target level of 97% despite the increase in roadworks as Highways England has attempted to keep lanes open where possible. Highways England has also consistently met its KPI target for incident clearance in RIS1, supporting better decision making in response to incidents on the network, and using historic incident data to locate Traffic Officers closer to problematic parts of the network so that they are able to clear incidents more quickly.

In RIS2 we have chosen to retain these headline measures of performance. For average delay we have set an ambition for performance at the end of RP2 to be no worse than at the end of RP1. Highways England will be required to demonstrate how it has acted to achieve this ambition. It will also make publicly available more granular information on delay on the SRN.

The RIS1 KPIs for network availability and incident clearance will continue to be used, with metrics being enhanced or targets raised to provide additional challenge. The network availability KPI will continue in its current form in 2020-21. As part of the development of a new metric to be introduced from year 2 of RP2 to more accurately reflect road user experience, Highways England will fully investigate a range of enhanced options for measuring network availability including taking account of speed restrictions in place owing to roadworks (for example, because of narrow lanes) and penalty weightings for full carriageway closures and, if practical, slip road closures. The incident clearance measure will now cover all 24 hours, and Highways England will report on the distribution of incident clearance times, and continue to provide additional details of long duration incidents.

A supporting set of PIs will capture performance in relation to:

- Delay on smart motorways
- Delay from roadworks
- Journey time reliability
- Delay on gateway (ports and airports) routes
- Average speed

During RP2 Highways England will work with Transport Focus to investigate future opportunities to make more granular information about delay on the SRN publicly available. We anticipate that this might include reporting on a regional basis, journeys between conurbations, and maps showing delay across the network on a link-by-link basis. Highways England will also investigate:

- The development of new metrics on journey time reliability which more

| **Fast and reliable journeys** | |
|---|---|
| **KPI** | ***Average delay***<br>Difference between the observed travel time and the speed limit travel time (seconds per vehicle per mile).<br>**Ambition:** Performance to be no worse at the end of RP2 than it is at the end of RP1. Highways England will be required to demonstrate how it has acted to reduce delays in support of this ambition.<br>**Network availability**<br>Percentage of the network free from traffic restrictions owing to roadworks.<br>**Target:** Achieve 97.5% lane availability in 2020-21. Existing metric to be replaced by a new expanded metric with target based on baselining work undertaken during 2020-21.<br>**Incident clearance rate**<br>Percentage of incidents cleared within one hour, based on 24 hour coverage.<br>**Target:** 86% of motorway incidents cleared within one hour. |
| **PIs** | ● Delay on smart motorways: average delay (seconds per vehicle mile) observed on smart motorways compared to all vehicles travelling at upper limit for variable speed limit sections.<br>● Delay from roadworks: average additional delay owing to roadworks, compared to a benchmark journey time before roadworks were in place. Calculated as average annual delay (minutes per hour travelled).<br>● Journey time reliability: measured as the average difference between observed travel time and the profile (normal) travel time.<br>● Delay on gateway routes: average delay (seconds per vehicle mile) observed on gateway routes compared to all vehicles travelling at speed limit.<br>● Average speed: average speed (mph) whilst travelling on the SRN. |
| **Commitments** | ● Working with Transport Focus, investigate the development of new metrics on journey time reliability which reflects more accurately road users' understanding of reliability, and delay in roadworks.<br>● Investigate new PIs on delays from incidents and delays on the local road/SRN boundary, and an alternative performance measure for smart motorway operation to keep track that these roads are delivering their intended journey-time related objectives. |

accurately reflect road users' understanding of reliability, and delay from roadworks. It will do this working in collaboration with Transport Focus and through its existing customer engagement routes. If suitable, these new metrics will be ready for operation at the beginning of RP3.

- New PIs measuring delays from incidents and delays on the SRN boundary with local roads, and improve the PI on delay on smart motorways for the start of RP3 if appropriate.

## Outcome 3: A well maintained and resilient network

Much of the SRN was built in the 1960s and 1970s – 57% of structures were built before 1980 – and many assets are now reaching their designed lifespan and require an increasing volume of works, in addition to regular maintenance needs. This activity is essential to keep the SRN running safely and smoothly, meet environmental commitments and ensure the SRN remains serviceable. Maintaining this national asset is also a key component of meeting customer and stakeholder expectations, particularly around performance.

Good practice asset management supports efficient maintenance and renewals delivery, minimises disruption for users, reduces the long-term cost of maintaining the network and ensures it operates effectively. Such an approach considers the whole life impacts of the decisions made and is consistent with Highways England's Licence.

### Measuring success

During RP1, Highways England reported against five main classes of asset: pavement (the road surface); structures (e.g. bridges); technology (e.g. overhead message signs); drainage; and geotechnical works (e.g. embankments and cuttings).

Road surface condition was used as a proxy for network condition in RIS1 and monitored against a target of ensuring that 95% of road surface did not require further investigation for possible maintenance. Other asset classes were reported as PIs. At the end of 2018/19, 95.5% of the network's road surface did not require further investigation. This above target performance represents a steadily improving picture following the introduction by Highways England of a recovery plan after pavement condition in the first year of RP1 was below target. Data reported by Highways England shows that the condition of other assets on the network covered by PIs is broadly stable.

Improving the quality of information across all asset classes formed an important piece of work during RP1, and was supported by a comprehensive data improvement plan, so that progress of this work can be monitored. In parallel, the metrics used to report condition were reviewed and improved.

In RIS2 we have chosen to retain road surface condition as a KPI and the headline measure of network condition. Highways England has trialled an improved pavement condition measure in RP1 which captures all lanes (rather than the RIS1 measure where the condition survey was restricted to the inside lane), analyses performance based on outturn condition, and is linked more closely to maintenance requirements. Because of the different datasets used in the new metric, the need to capture a full data baseline and then understand how the datasets behave, it is not currently possible to identify the target which would maintain performance at a level consistent with RIS1. We therefore require

Highways England to continue to target performance of 95% against the RIS1 pavement metric until March 2022, when additional data should allow an unambiguous assessment of the necessary target for a new metric.

A supporting set of PIs will capture performance in relation to:

- Structures condition
- Technology availability
- Drainage resilience
- Geotechnical condition

While this outcome area focuses on technical measures, ride quality will be measured as part of the Meeting the Needs of all Road Users outcome area.

Through RIS1, Highways England has improved its asset management capability and maturity, helping to make better asset investment decisions. Its Informed Asset Management Plan (IAMP) describes the activities and related benefits to improve the asset management approach; it also supports the Licence requirement to be consistent with the international standard on asset management (ISO55000).

The focus of the IAMP (Highways England's first asset management improvement plan) was to improve many key areas, including publication of an asset management policy and strategy and improving asset information to support better asset investment decisions. Building on the IAMP and lessons learned from both RIS1 delivery and RIS2 Business Case development, an updated improvement plan is being developed; the Asset Management Development Plan (AMDP).

The plan will describe improvements to better connect Highways England's activities across the whole asset lifecycle (covering asset creation, maintenance, operation and renewal), resulting in an improved and more consistent level of service to its customers. The AMDP will cover RP2 and will be broken

| **A well-maintained and resilient network** | |
|---|---|
| **KPI** | ***Pavement condition***<br>**Target:** Achieve 95% of road surface that does not require further investigation for possible maintenance for years 1 and 2 of RP2, based on the continuation of the current pavement metric. Target for years 3 onwards will be based on the concept of road surface in good condition and determined through parallel running using the new metric trialled in RP1. |
| **PIs** | ● Structures condition: average structural condition; critical element condition; and structural condition Index.<br>● Technology availability: percentage of time roadside assets are available and functioning.<br>● Drainage condition: measure of percentage of carriageway that does not have an observed significant susceptibility to flooding. From 2024/25 it is intended that this metric will be weather normalised.<br>● Geotechnical condition: percentage length of asset in good condition. |
| **Commitments** | ● Implement the AMDP for RP2 as described above.<br>● Investigate an improved structure condition metric during RP2, and an alternative indicator for technology assets. |

down and monitored through defined annual deliverables.

Ahead of its implementation, the plan will be mapped against ISO55000 to ensure Highways England continues to meet its Licence obligations. Highways England will engage with ORR and the Department in the development of its five-year plan, including the proposed annual deliverables prior to the start of each financial year in RP2.

## Outcome 4: Delivering better environmental outcomes

We recognise that the development and operation of the SRN has environmental impacts, both in the immediate vicinity of the network and further afield. These influences on the environment are multifaceted, but include effects on noise, carbon dioxide and other greenhouse gas emissions, air quality, and biodiversity. Our objective is to secure positive environmental impacts from RIS2, and where negative impacts cannot be avoided that they should be mitigated as far as possible. Highways England is required under its Licence to ensure that protecting and enhancing the environment is embedded into its business decision-making processes and is considered at all levels of operations.

As in RIS1, we will use designated funds to achieve environmental improvements beyond 'business as usual'. In RP1 this approach has facilitated important progress in a number of areas, such as mitigating 1,150 of the Noise Important Areas most affected by road noise from the SRN. However, we also expect Highways England to:

- consider the environmental impact of how it plans, maintains and operates its network, and in its development of major schemes; and,
- cooperate with local authorities to address impacts of the SRN on people and places neighbouring the network.

We also expect that Highways England will build upon its progress in RP1 to achieve a further improvement of environmental outcomes during RP2, in line with, but not limited to, government policy on the environment as set out in the *25 Year Environment Plan* and the *Air quality plan for nitrogen dioxide*, *Clean Growth* and *Road to Zero* strategies.

### Measuring success

During RIS1, Highways England reported against two environmental KPIs, related to noise and biodiversity, as well as reporting progress related to improving air quality, reducing the carbon footprint of its activities, and acting to lessen water pollution from the SRN. As part of the RIS1 performance specification, Highways England was also required to develop new metrics to reflect the fuller extent of the environmental impact of the SRN. This activity means that the RIS2 performance specification now monitors more aspects of Highways England's environmental performance.

In RIS2, we have chosen to retain a KPI monitoring Highways England's efforts to mitigate the impact of excessive road noise. The revised RIS2 metric will measure the number of households in Noise Important Areas mitigated, with a target of 7,500 households to be mitigated through a combination of offering noise insulation for affected households, constructing noise barriers, and the use of quieter road surfaces. This activity will be funded from the Environment and Wellbeing designated fund.

The RIS1 performance specification required Highways England to produce a Biodiversity Action Plan, and to make progress against its

delivery. In RIS2, the biodiversity KPI will go further by requiring Highways England to deliver No Net Loss of biodiversity across its soft estate over the course of the road period, using Natural England's assessment approach. This would measure both the contribution of the enhancement schemes under construction in RP2 and the status of Highways England's soft estate.

We also expect Highways England to make further progress on improving air quality around the network. During RP2, Highways England will be subject to a KPI measuring the number of network links which are in exceedance of the legal $NO_2$ limits agreed with the Department and based on the Pollution Climate Mapping model.[43] The target will be to reduce these agreed links in exceedance to zero in the shortest possible time. This will be delivered through the programme of work already agreed. The findings of phase 3 of this programme will be published shortly and will set out the measures Highways England has identified to address $NO_2$ pollution levels in the shortest possible time.

Alongside this, Highways England will investigate and assess incorporating into new and existing contracts air quality standards for supply chain vehicles and associated reporting requirements. A more detailed timetable for these investigations will be produced in Year 1 of RP2, as well as potential implementation opportunities identified by that stage.

The fourth KPI in this outcome area will measure Highways England's own carbon emissions: the carbon footprint of heating and lighting its buildings and offices, the fuel consumed by Traffic Officers' patrols and business travel, and the electricity used for roadside signs and lighting. We expect that the associated target will be introduced from Year 2 of RP2 onwards in order to ensure that the data underlying the measure is

43 At: https://uk-air.defra.gov.uk/research/air-quality-modelling?view=modelling

robust. In addition, although outside the scope of this performance specification, Highways England will be expected to reduce its carbon emissions in line with its new Greening Government Commitments, which will be in place from April 2020.

A set of supporting PIs will complement these KPIs relating to the following:

- Supply Chain Carbon emissions
- Condition of Cultural Heritage assets
- Water quality
- Litter

These PIs are intended to offer context to ORR in measuring Highways England's overall environmental performance and increase transparency. We will also require Highways England to produce additional annual sustainability reporting in the form of an update within its Annual Report. This is intended to provide even greater visibility of how Highways England is meeting both its statutory and Licence obligations to ensure the best practicable environmental outcomes across its activities.

During RP2, Highways England will investigate new environmental metric(s) informed by the

| Delivering Better Environmental Outcomes | |
|---|---|
| **KPI** | ***Noise***<br>**Target:** 7,500 households in Noise Important Areas mitigated using funding from the Environment and Wellbeing designated fund during RP2.<br>Biodiversity<br>**Target:** Achieve No Net Loss of biodiversity over the whole Highways England soft estate by the end of RP2.<br>***Air quality***<br>**Target:** Bring links agreed with the Department and based on the Pollution Control Mapping model into compliance with legal $NO_2$ limits in the shortest possible time.<br>***Highways England carbon emissions***<br>**Target:** Reduce Highways England's carbon emissions as a result of electricity consumption, fuel use and other day-to-day operational activities during RP2, to levels defined by baselining and target setting activities in 2020-21. |
| **PI** | ● Supply Chain Carbon emissions: emissions from Highways England's contractors (including embodied carbon from construction) per million pounds spent.<br>● Condition of Cultural Heritage assets: aggregate 'quality score' of Highways England's Cultural Heritage assets.<br>● Water Quality: length of watercourse enhanced through the mitigation of medium, high, and very high risk outfalls as well as through other enhancements, for example river retraining/rewilding<br>● Litter: percentage of the SRN where litter is graded at B or above under the Litter Code of Practice. |
| **Commitments** | ● Investigate, and as appropriate develop, new environmental metric(s) informed by the natural capital approach.<br>● Investigate and assess incorporating into new and existing contracts air quality standards for supply chain vehicles deployed on Highways England work, and associated reporting requirements. A more detailed timetable for these investigations will be produced in Year 1 of RP2, as well as potential implementation opportunities identified by that stage. |

natural capital approach to support an understanding of quantity and quality of natural capital and where it is vested.

## Outcome 5: Meeting the needs of all road users

User satisfaction reflects the success of Highways England in delivering better performance through its investment and the day to day operation and management of its network. As outlined earlier, Transport Focus's *Road Users' Priorities for the Road Investment Strategy*, identified nine key road user priorities for RIS2 funding. The findings of Transport Focus were reflected in the responses from users and user representative groups received during the Department's public consultation on RIS2.

Alongside the insight provided into the priorities of motorists, Transport Focus has undertaken pilot surveys of satisfaction for non-motorised users,[44] and logistics and coach businesses that use the SRN (the *Logistics and Coach Manager Survey*).

The investment we are making on the SRN in RP2 is unprecedented, and will simultaneously challenge and raise users' expectations of their experience of the SRN. A future-proofed network offering improved ride quality requires maintenance, renewals and enhancements. The resulting roadworks will affect journey time reliability, and the overall time taken to complete journeys. The challenge for Highways England is to mitigate these impacts on road users through roadworks management and coordination, and provide accurate and timely information to help road users plan journeys.

It also means keeping road users aware during evolving situations to allow them to manage their expectations, for example during unpredictable disruption such as incidents or poor weather. We know that road users value accurate and timely information when they encounter unexpected disruption as it helps them to re-plan both their journeys and the activities that depend on them, and are reassured by a clear, well-rehearsed plan to get roads up and running again as quickly as possible.

During RP2, Highways England should continue to maintain and improve facilities for non-motorised users, supported by the Users and Communities designated fund. We also expect that Highways England will continue to consider how the SRN integrates with public transport to meet users' accessibility needs.

### Measuring success

The main measure of user satisfaction in RP1 was the NRUSS. Highways England was targeted with improving the overall NRUSS score to 90% by 31 March 2017 and then maintaining it to at least that level over the remaining years of RP1. The disaggregation that the survey has provided, combined with a clear customer service strategic plan has provided the basis for an annual customer plan, formulated after consultation with Transport Focus, that extends across all Highways England's business units.

44 Surveys have been published of users in the North West and East Midlands at: www.transportfocus.org.uk/research-publications/publications/cyclists-pedestrians-equestrians-measuring-satisfaction-journeys-highways-englands-network-north-west-east-midlands/ and in the West Midlands, Berkshire and Hampshire at: www.transportfocus.org.uk/research-publications/publications/cyclists-pedestrians-and-equestrians-measuring-satisfaction-with-journeys-on-highways-englands-network-in-the-west-midlands-berkshire-and-hampshire/tf-cpe-report-september-2019/

RIS1 also included a requirement that Transport Focus develop a more robust measure of road user satisfaction. Transport Focus has developed and is operating the new SRUS measure of satisfaction in parallel with NRUSS, and SRUS consistently tracks between five and six percentage points lower than NRUSS. This is owing to the widely different methodologies of the two surveys.

In setting an SRUS target for RIS2, we have also taken account of the level of disruption to road users resulting from a peak in enhancement schemes under construction during RP2, including works associated with HS2 and other major transport projects affecting the SRN." and insert a paragraph break afterwards. However, we also understand that there are external factors beyond Highways England's control (for instance extreme weather events) that can also affect user perception. We have set an SRUS-based target of 82% for 2020-21 and 2021-22, with year on year increases in following years. Because of the uncertainty in any new metric, we are proposing that road user satisfaction targets for post 2021-22 are reviewed at the end of the second year of RP2.

Highways England can do much to affect directly the experience that road users have when using its network. The management of incidents and management of roadworks are captured as targeted KPIs in the Fast and Reliable Journeys outcome area. However, as Transport Focus research has highlighted, timely and accurate information to road users is important too. In RIS2 we are therefore including an additional user-centric targeted KPI which will measure Highways England's performance in providing advance roadworks information seven days ahead of when work takes place.

A supporting set of PIs will capture performance in relation to:

- Timeliness of information provided to road users through electronic signage
- Ride quality
- Working with local highways authorities

We want Highways England to play its full part in supporting the delivery of the Government's *Cycling and Walking Strategy*. Alongside Transport Focus's cyclist and pedestrian satisfaction survey, we encourage Highways England, using existing insight processes, to work with it to review particular concerns among these user groups and identify hotspots on the network where there are particular issues.

The designated funds will make a contribution to improving the experience of cyclists and pedestrians using or crossing the SRN, and bus and coach passengers using services on the network, as will enhancement schemes where opportunities are identified. Highways England will collate these insights and the work it is doing in a specific section of its Annual Report covering non-motorised users and integration.

Highways England already has a duty within its Licence to cooperate with local highways authorities, and highway authorities in Scotland and Wales to facilitate the movement of traffic and manage its impacts, and to respond to and manage planned and unplanned disruption to the network. Transport Focus's research has highlighted better integration with other roads as a road user priority not covered explicitly in other metrics. The RIS2 performance specification reinforces the existing Licence duty and Highways England will report on its work with local highways authorities to review diversion routes for unplanned events.

| Meeting the needs of all road users | |
|---|---|
| **KPI** | ***Road user satisfaction***<br>**Target:** Achieve an 82% road user satisfaction score in 2020-21 and 2021-22, with year on year increases in following years.<br>***Roadworks information timeliness and accuracy***<br>**Target:** Achieve 90% accuracy of roadworks information seven days in advance of works by 2024-25, with an increasing trajectory of improvement through RP2 from the level of performance achieved by the end of RP1. |
| **PIs** | ● Timeliness of information provided to road users through electronic signage: measured as the average time taken to set a signal.<br>● Ride quality: metric to initially be a subset of the pavement condition metric which captures surface quality. Metric to be developed during years 1 and 2 of RP2, and be in place for year 3, in consultation with Transport Focus to provide a user-centric view of ride quality.<br>● Working with local highways authorities to review diversion routes for unplanned events. |
| **Commitments** | ● Review SRUS performance in year 2 of RP2 to determine the road user satisfaction targets for post 2021-22.<br>● Develop with Transport Focus during RP2 a measure of ride quality which reflects road users' experience of the network.<br>● Investigate expanding the scope of the timeliness of electronic signage information PI to potentially include the time taken to adjust and clear signs.<br>● Work with Transport Focus to develop satisfaction surveys for cyclists and pedestrians that can be used, if possible, as the basis of a PI later in RP2.<br>● Work with Transport Focus to develop satisfaction surveys for logistics and coach managers that can be used, if possible, as the basis of a PI later in RP2.<br>● Investigate expanding the scope of the working with local highways authorities PI to include diversion routes linked to planned roadworks. |

## Outcome 6: Achieving efficient delivery

Following the establishment of the new governance framework for the management of the SRN and the five-year RIS cycle, created as part of Roads Reform in 2014, it was originally envisaged that at least £2.6 billion of efficiencies and cost savings could be achieved over a ten-year period. For RP2 and beyond, the intent will be to continue to demonstrate a high value of efficiency that benefits taxpayers through effective and productive delivery, and road users through faster, predictable delivery of schemes.

### Measuring success

Highways England's efficiency target in RIS1 was to demonstrate £1.212 billion savings on capital expenditure by the end of RP1. It has provided reporting against this target through:

- **Bottom-up description of efficiency achieved** – presenting case study evidence of the actions it has taken to deliver efficiency.
- **Unit cost information** – Highways England has developed efficiency models based on cost movement information covering smart motorway efficiency, renewals and capital enhancements efficiency.
- **Delivery of the Road Investment Strategy** – Highways England received post-efficient funding, in other words funding levels were set after the removal of expected efficiency. It has reported on its delivery of the investment programme outputs, outcomes and scheme progression within the funds provided.

Following the efficiency review advice from ORR, we have set the objective that during RP2 Highways England should demonstrate £2.304 billion of additional savings on operating and capital expenditure.

This target reflects ORR's judgement based on findings from several pieces of analysis including: three capability reviews; targeted studies including efficiency benchmarks achieved by other regulated companies; a sample-based deep dive review of key cost components; and its experience of monitoring Highways England's efficiency performance in RP1. ORR has the role to review the evidence of the efficiency generated by Highways England during RP2.

As well as demonstrating financial efficiency, we want to ensure that the investment plan schemes are delivered in a timely manner. The RIS2 investment plan sets out which enhancement schemes are expected to start construction (start of works), and which schemes are expected to open for traffic during RP2. Highways England will set out commitment dates in its Delivery Plan for each scheme and for ORR will monitor adherence to these dates within its enhancement scheme and investment programme monitoring processes.

A supporting set of PIs will capture performance in relation to:

- Cost Performance Index
- Schedule Performance Index

These will demonstrate whether schemes in construction are being delivered at or below the original project performance (or cost) baseline, and whether key points in the delivery of schemes have been achieved in line with planned timescales.

| Achieving efficient delivery | |
|---|---|
| **KPI** | ***Total efficiency***<br>**Target:** Evidence the efficiency target of £2.304bn capital and operational expenditure is demonstrated by the end of RP2. |
| **PI** | Earned value metrics for projects in construction<br>● Cost Performance Index: this is commonly used in the construction industry as a measure of earned value. It is the ratio of budgeted cost of work performed to date to actual cost to date.<br>● Schedule Performance Index: this is commonly used in the construction industry to measure progress against the agreed schedule. It measures the ratio of value actually delivered (budgeted cost of work performed to date) to value scheduled to be delivered to date. |
| **Commitments** | ● Investigate and look to develop new or improved metrics to monitor cost and schedule for enhancement scheme development and construction, engaging with ORR. |

# Part 3
# Investment Plan

SPARKHILL
ELECTRICAL LTD
RAVENHEAT
DOMESTIC GAS BOILER
MANUFACTURER

**In 2015, the Government announced the most ambitious programme of roads investment in a generation. RIS2 takes this as its foundation, and builds upon it to produce a programme of investment that is larger and even more thorough than its predecessor.**

**For the first time, the Department for Transport and Highways England have had four years to study the needs of the SRN and prioritise the measures that the country needs. ORR and Transport Focus have provided informed, independent advice to contribute to our evidence base.**

**This investment plan sets out the Government's expenditure priorities and the details of what that programme is expected to mean in terms of outputs.**

# a. Government priorities

## Maintenance

RIS2 has identified a growing challenge on our strategic roads. The network that we have was predominantly built in the 1960s and 1970s, and is around 50 years old. In our cities, many of the other structures built in this era are now coming down; in the case of our major infrastructure we must ensure that they continue to stand up, notwithstanding the ever-growing volumes of traffic using the network. As age takes its toll, there must be no deterioration in safety or journey quality.

RIS1 has made sure that the SRN remains safe and serviceable, with large scale programmes of repair and resurfacing. Highways England has prepared for RIS2 by making a wide-ranging analysis of the long-term condition that we can expect if current trends continue. This shows that the need for maintenance will increase, and that we can best limit the cost and the disruption to road users by acting now.

Three particular areas have been identified as needing a substantial increase in investment, driven by the ageing of our assets and the particular pressures caused by the high volumes of traffic using these key roads.

- Structures – bridges, underpasses, retaining walls and similar – will need more extensive renewal works.
- Safety barriers will require replacement at a faster rate to make sure that they remain effective
- The oldest type of concrete road surface ("pavement"), with its distinctive ridged construction, will need to be phased out entirely over several road periods.

This will cost £1.2 billion over RP2, some of which will be secured through efficiencies in other parts of the budget to maintain and renew assets. As a result, England's strategic roads will continue to be amongst the safest in the world.

## Completing RIS1 enhancements

RIS1 set in train a transformational programme of investment in our strategic roads. The average road project takes around eight years to get from inception to opening, and the newest commitments made in RIS1 were always expected to be under construction during the period covered by RIS2. Government is keeping its promise to deliver these improvements where they remain value for money, some of which have been critical local demands for decades.

- Pinch-points like the Black Cat junction on the A1 at St Neots and junction 6 on the M42 at Birmingham Airport will be brought up to a modern standard.
- Key regional connections, such as the A30 into Cornwall and the A1 north from

Newcastle, will see their disparate sections of dual carriageway linked together into joined-up, high-quality roads.

- Major new high capacity corridors will link together the different parts of England, including extra motorway capacity to link the Midlands to the South East, and a better A14 to link Felixstowe to the Midlands and North.
- Environmental challenges will be addressed. Planned projects to upgrade cycling around the network will go ahead, and major environmental upgrades like the Stonehenge Tunnel on the A303 will start construction.

Over the next two years, we expect over fifty projects to be in construction, representing the biggest concerted upgrade to our road network in a generation.

## Tackling congestion

The proposals set out in this investment plan are intended to tackle congestion. It is widely accepted that it is not possible to outbuild congestion across the whole of the road network; but it is equally true that there are many locations where poor road design or outdated infrastructure condemns thousands to avoidable frustration. RIS2 will address more of the most notorious delays, including Simister Island in Manchester, the Air Balloon in Gloucestershire and around Newark in Nottinghamshire.

The congestion-tackling measures of RIS2, coupled with the projects being completed in RIS1, will lead to major improvements at some of the worst hotspots on our network. Their impact is so large that, taken across the network, it will counter the rising demand for our strategic roads and mean that we expect average network performance will be at least as good in 2025 as it is in 2020.

## Levelling up

RIS1 set out to tackle longstanding problems on our road network. RIS2 also looks to the future: not only fixing the network we have but helping to create the economic infrastructure that we need in the years ahead.

In particular, RIS2 makes three major commitments to schemes for delivery through coming road periods that can underpin a wider economic transformation.

- Dualling the A66 between the A1(M) and the M6, creating the first new trans-Pennine dual carriageway since 1971. Overall, the projects delivered through RIS2 should add a third to the strategic road capacity across the Pennines.
- Providing a new crossing allowing the Thames Estuary to flourish as an area in its own right and overcome historic problems of deprivation.
- Improving the A46 'Trans-Midlands Trade Corridor' between the M5 and the Humber Ports. Work in RP2 will create a continuous dual carriageway from Lincoln to Warwick, delivering one of Midlands Connect's key priorities.

The North and Midlands will both benefit greatly from the improvements being committed. Thanks to RIS1, Newcastle is connected to the national motorway network for the first time. In addition to new capacity across the Pennines, we expect to improve motorways around Warrington, Wigan, St Helens and Leeds, as well as key upgrades in Sefton, Sunderland and South Yorkshire. In the Midlands, extra motorway capacity should benefit Stoke, Stafford and Solihull. RIS2 also funds delivery or development of work to improve access to the key East Midlands cities of Nottingham, Derby and Leicester.

RIS1 improved access to ten major ports; RIS2 goes further by offering major strategic interventions that will make it quicker and easier to trade globally. Thanks to the Port Infrastructure Fund, announced in September, work has begun on developing schemes that would upgrade the A2 near Dover and the junctions approaching Felixstowe and Southampton ports. RIS2 will ensure more projects exist to support other key gateways.

## Unlocking growth and housing

Infrastructure is vital if our economy is to grow and if new housing is to be built across our nation. In many cases, the local road network (including cycleways and footpaths) will be the main link for new employment spaces and homes, but more sizable developments may require enhancement of the SRN too if new traffic is to be accommodated without imposing unacceptable congestion and safety impacts on existing routes.

The projects committed for funding in this document could support the creation of hundreds of thousands of jobs and homes. These arise not just from large-scale enhancements, but also many of the individual junctions and widenings, several of which could help unlock ten thousand or more new homes or enable major new business developments, while safeguarding the SRN's strategic function.

In supporting this goal, RIS2 aligns with the HIF, adding infrastructure where it can do the most good to support extra housing and working with local authorities to deliver the best results. We expect to make sure that HIF commitments delivered by Highways England have as much priority as other commitments in this document.

In some cases, improvements to the road network are closely tied to specific developments, and the individual developer is expected to contribute to scheme costs. As with RIS1, RIS2 is structured to give such projects the same priority as those fully

funded by government, provided that other parties contribute as expected.

This can extend to road projects that might facilitate an increase in the value of development land more generally, over many years and even decades. In line with other types of transformative infrastructure, we will continue to explore funding contributions from third parties based on the increase in the value of development land that the road project unlocks, whether in the short or longer term.

## Improving the environment

Much of our road network was built before modern ideas of environmental mitigation were adopted and which are applied when new road capacity is constructed.
The performance specification has set out our ambition to continue improving the environmental performance of the SRN, and the enhancements listed in this document help to realise that vision.

We have streamlined the system of designated funds, so that there is a single, larger fund for dealing with environmental impacts, including air quality. There is also a fund for Users and Communities, which will continue to support the creation of better facilities for walking and cycling around the network, and make it easier for people to get access to public transport where it uses the SRN.

These projects will improve the lives of thousands of people living near the network, and change the environmental management of our existing roads for the better, moving towards what people rightly expect for new roads. The way in which these funds are operated will change as well, so that environmental groups will play a bigger role in how funds are invested for maximum benefit.

## Innovative and future-ready

Making progress against all these priorities will demand innovation on the part of Highways England and its supply chain. Highways England's digital ambitions will see approaches to construction, operations and customer interaction transformed during RP2, driving improvements in safety, efficiency and customer experience.

Highways England will continue to collaborate with government, client bodies and other parties to share best practice and drive continuous improvement in these areas through the Transport Infrastructure Efficiency Strategy.[45]



45 At: www.gov.uk/government/publications/transport-infrastructure-efficiency-strategy-one-year-on

NEW ROAD
LAYOUT
AHEAD

# b. Maintenance

The SRN is one of our nation's most important physical assets, valued at over £100 billion. Every day, it carries two-thirds of the miles travelled by HGVs, linking every factory and filling every supermarket shelf. Without this network, Britain cannot function.

This means that maintaining our busiest roads is a critical requirement, and failure to do so would have serious consequences. The collapse of the Ponte Morandi in Genoa and the I-35W Bridge in Minneapolis show that there can be tragic consequences from underinvestment. Highways England monitors the condition of structures on the SRN to ensure they are safe to use and, at its most basic level, a five-year strategy such as RIS2 must prevent the situation where roads have to be closed because they fail safety inspections.

Yet a good strategy for maintenance does more than prevent major asset failure. By investing early, it is possible fix problems efficiently and quickly, often at night when few people are using the road. The longer problems are left, the more work is required to correct them. Once problems are big enough, they can only be fixed through more extensive work, which are more likely to require work during the day, or even the full closure of the road. The more emphasis that is placed on maintenance, the less it costs and the less it disrupts the lives of those who depend on the road.



## Examples of cost and user impacts from deferred works where assets do not fail

Deferred work example structure (bridge) and Concrete Pavement renewals

The following scenarios have been tested for planned RP2 renewals:

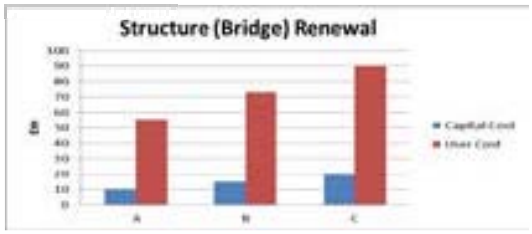
A. **Planned Maintenance** (driven by asset need and best practice Asset Management)

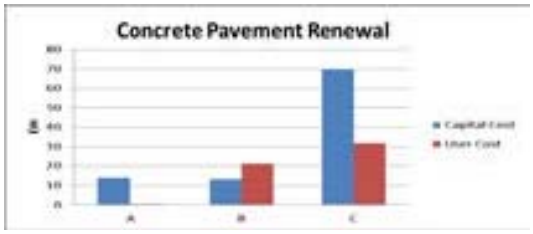
B. **Delayed Maintenance** (still in RP2 but less frequent)

C. **Postponed Maintenance** (push back to RP3) (consider safety implications)

Increasing cost ↓

| Scenario | Example Post Tensioned Bridge Renewal (User impact £M) | Example Pavement Renewal (User Impact £M) |
|---|---|---|
| A | 55 | 0.4 |
| B | 73 | 21 |
| C | 90 | 32 |



In preparing RIS2, Highways England has made a detailed assessment of the needs of the road network, and this has highlighted the increasing challenge of an ageing network. On the back of this evidence, we are taking action now to stay ahead of the problems this will present.

## The ageing network

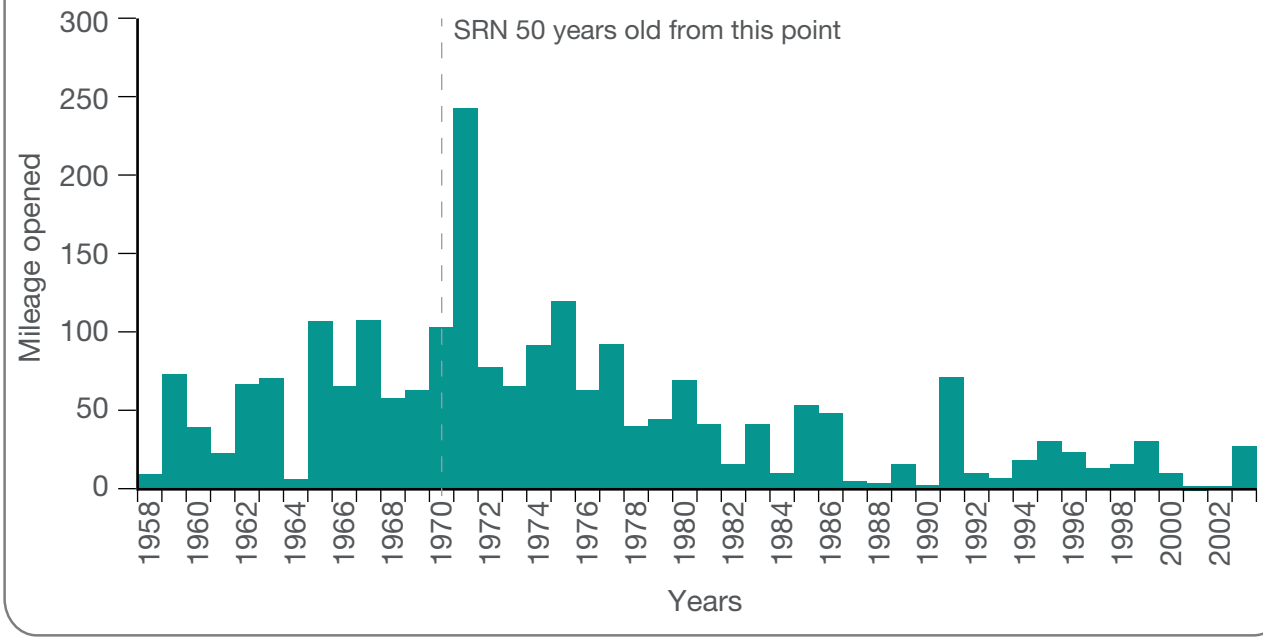
Most of the SRN was built in the 1960s and 1970s, using the techniques available at the time. The development of the motorway network was the greatest civil engineering project of the post-war era, involving roads over mountains and mile after mile of concrete viaducts. But it is only with time that the limitations of some of these techniques has become apparent.

These parts of the network are now around 50 years old, and more elements require maintenance. In addition to regular activities such as resurfacing the road and repainting markings, there is also a need for deeper activity. Waterproofing and bridge bearings must be replaced; salt corrosion must be addressed; and safety barriers reach the end of their design life. These issues become more acute the more heavily trafficked our roads become – and with some sections of the strategic network carrying more than 200,000 vehicles a day, this need becomes acute.

Because Highways England has had almost five years to gather data about its network in preparation for RIS2, we have more information about the extent of this issue than ever before. We can see that a large quantity of additional work will be required within a decade, and that the best way to deal with this is to take action now.

In particular, this analysis has highlighted three key areas where a significant increase in investment is needed, in order to make sure that problems never materialise.

**Increasing number of structures requiring remedial work**



### Case study – Oldbury Viaduct

The M5 Oldbury Viaduct sits at the heart of Birmingham's road network. In 2013, routine pothole filling found unexpected damage to the underlying deck, the structure on which the road itself rests. More than forty years of salt water had seen chlorides percolating into the underlying concrete, meaning that it became much more vulnerable to decay. This meant that this part of the M5 was experiencing potholes at a much higher rate than expected, and also meant that the structure was less able to deal with heavy loads than had been thought.

The damage within the structure had been invisible, but once it was found the scale of the problem became clear. Emergency measures were taken to prop the viaduct up, to ensure there was no risk to the public. Work then began to prepare for one of the largest programmes of structural maintenance ever undertaken on a UK motorway.

Highways England has implemented a comprehensive programme to repair the soffits, decks and deck ends, and to renew the waterproofing whose failure had caused the original problem. Bridge joints were replaced and the pavement resurfaced; and the opportunity was also taken to upgrade vehicle restraint systems, lighting and drainage.

There was no prospect of closing the M5 while this work was done. To enable both the local and motorway network to continue to function, a contraflow system was put in place, with all traffic using either the north or southbound carriageway at a time across two narrow lanes in each direction with a 30mph speed restriction.

The final cost of the work is expected to be over £180 million, making the scheme the largest concrete repair project ever undertaken in the UK.

- Renewing bridges and other structures
- Replacing safety barriers and other forms of vehicle restraint
- Retiring the first generation of concrete pavement

We have made funding this programme the first priority for available resources in RIS2. We will use Lean techniques, coupled with the most effective technologies available, to make best use of these resources.

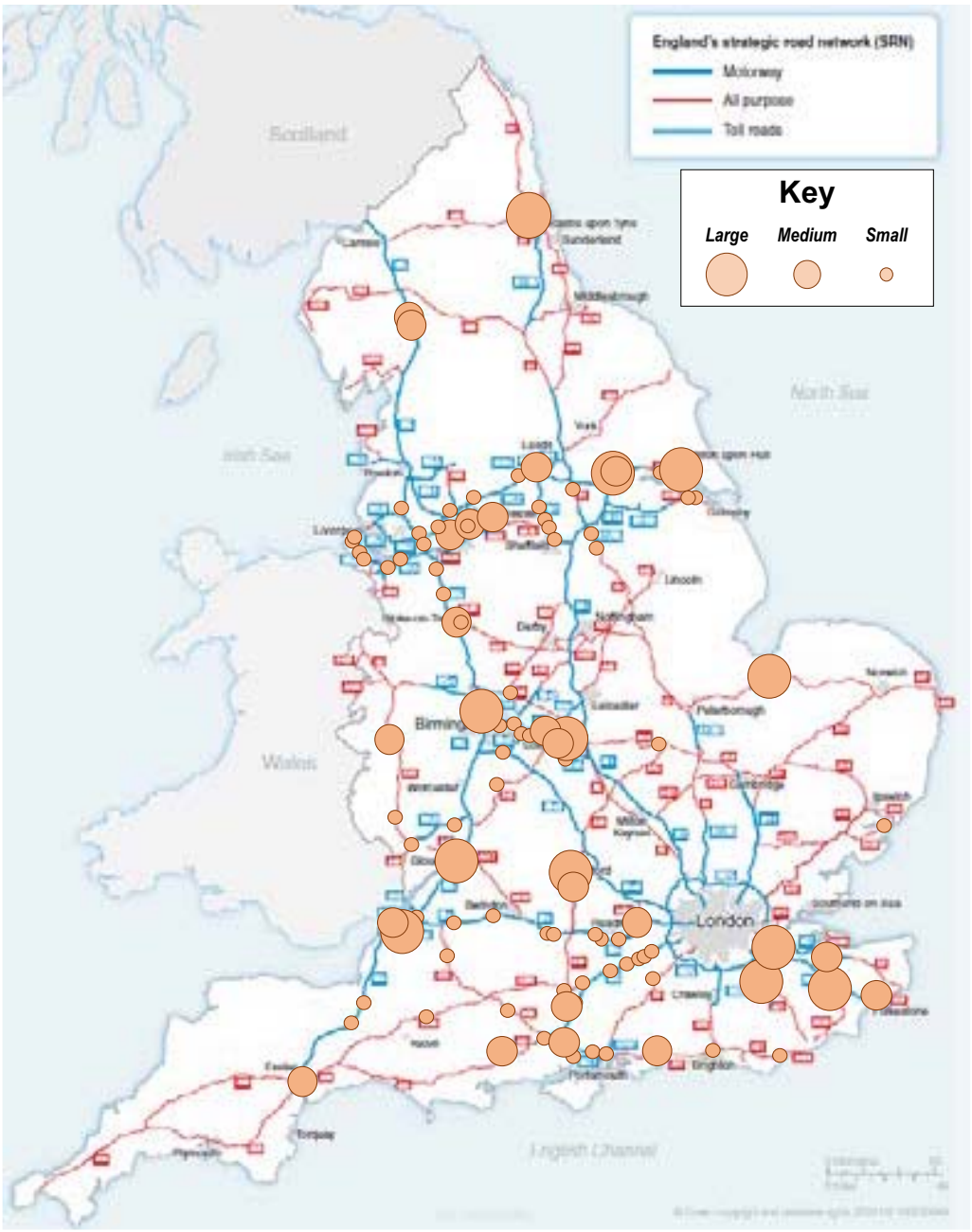
## Maintaining bridges and structures

There are over 20,000 bridges, underpasses, retaining walls and other kinds of structure on the SRN. These are the most complex and sensitive elements of the SRN. A single bridge bearing can have to carry a weight of up to 960 tonnes. Given where they are located, many structures are exposed to wind, rain, cold and salt corrosion. Furthermore, many of the largest structures on our network were built in the earliest years of our motorway network, before civil engineers had much experience of what their long-term maintenance needs would be.

When problems develop, it can quickly have an effect on the people using the road: emergency measures can include weight restrictions or lane closures. This can be particularly problematic, since many of the most heavily used structures are on some of the busiest sections of the road network. The Midlands Links in Birmingham, the Exe viaduct in Devon and the Thelwall viaduct over the Manchester Ship Canal are three very large structures that are essential to the communities around them.

Less than 1% of our structures are considered to be in poor condition; and where they are, plans are already in place for action before they become unsafe. But more pre-emptive work is needed to make sure

**Indicative mapping of major structures renewed by 2025**



that the legacy of 1960s construction does not all materialise at the same time.

We expect to spend in the region of £1 billion renewing structures in RP2, on top of the roundly £500 million required for day-to-day maintenance. This means interventions on an estimated 190 structures. In some cases, this means relatively limited work to nip problems in the bud. In some others, it requires deep intervention, stripping back the structure to its core so that modern solutions can be used to fix sources of risk arising from historic design and construction.

## Safety barrier replacement

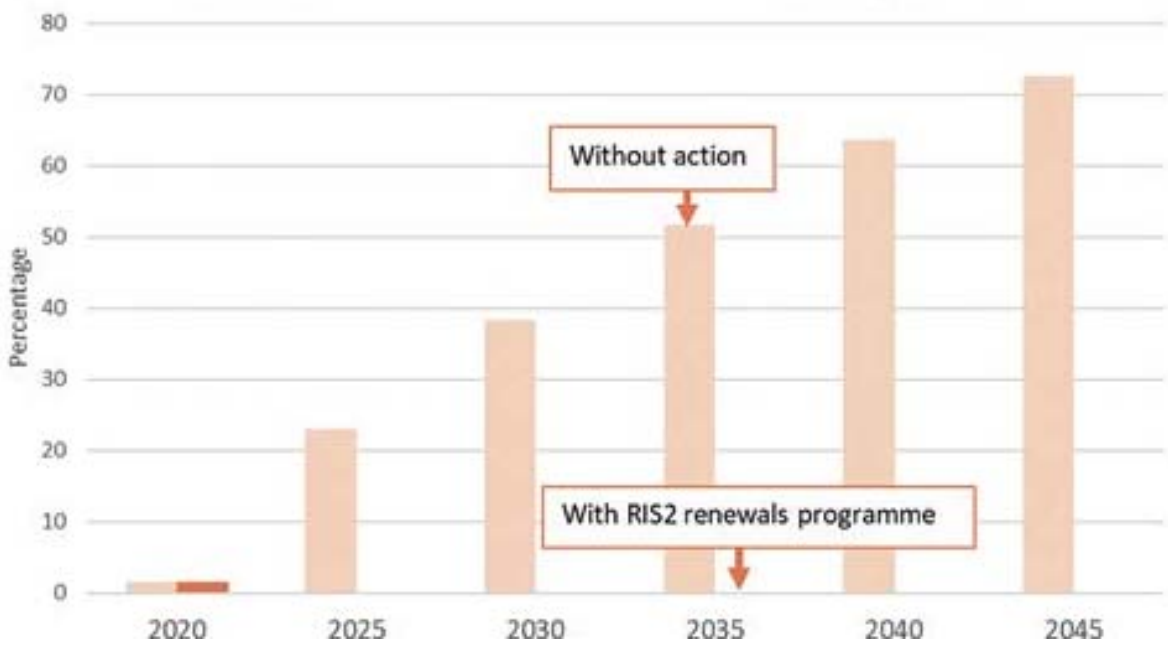
There are nearly 8,000 miles of vehicle restraint systems on the SRN – almost enough to form a continuous line from Land's End to Antarctica. This includes barriers in the middle of the road, and also those at the sides. Three different types of safety barrier are used: wire, steel and concrete.

Steel barriers are the most common, but are also the most vulnerable to corrosion. Most barriers are made of galvanised steel, which can resist rust for many years. But once decay has passed a certain point, it is essential that the barrier is replaced in order for it to do its job. That process occurs fastest in areas where gritting is regularly needed, and where salt accelerates the speed of deterioration.

Without investment, 20% of the network would see its safety barriers degrade to the worst category for safety. We therefore intend to invest up to £450 million between 2020 and 2025 renewing over 1,000 miles of safety barriers – the equivalent of building a wall from London to Middlesbrough every year of RP2. This is enough to ensure that no roads fall into such poor condition.

Because we will be working at scale, as part of a long-term strategy, we expect this to be a much more efficient process than it would be approached on a case-by-case basis.

**Crash barriers in worst condition category**



## Retiring concrete pavement

Concrete was the dream material of the 1960s civil engineer. When our strategic roads and motorways were being built, they laid around 600 lane-miles of concrete pavement, built out of large concrete blocks laid next to one another. At the time, this promised cheap, durable construction; but today most road users are more alert to its weaknesses. As such roads have aged, the sections of concrete have shifted up or down, creating a rise or fall every few yards where the blocks join. Such roads are famed for the distinctive repetitive thumping sound experienced when driving.

Modern concrete road has learnt from this experience, and now uses a continuous-pour technique to create a single, jointless surface. But older concrete roads require constant maintenance to maintain the joints between one concrete block and the next. Today, these roads are safe; but this will no longer be true if they are left to deteriorate.

Furthermore, Transport Focus has gathered the views of people who use the SRN, and this work has highlighted that one of the highest priorities of the travelling public is the

quality of pavement on which they drive. Old-style concrete pavement is notorious amongst drivers for its poor ride quality, even before questions of safety are factored in.

This creates a compelling case to begin retiring this outdated kind of pavement. This is no small task. Switching from old-style concrete to other surfaces requires the full reconstruction of much of the road, and the volume of work required is equivalent to building a motorway. All of this must be accomplished in a way that does not deprive communities of roads that are critical to their way of life.

It will take around 25 years to complete the task in full; but the process begins now, with around £400 million of investment over the period 2020-25. Around half of the old-style concrete pavement on the network will either receive holding repairs, or will be replaced entirely during RP2. Several of our major projects, such as the improvement of the A12 in Essex, will also result in outdated concrete pavement being replaced with an entirely new, modern road surface.

## Other areas of maintenance

Although RIS2 prioritises three areas of new maintenance, at least a further £2 billion is expected to be spent on more traditional aspects of renewing and maintaining the network. This includes:

- Around £1.4 billion expected to be spent resurfacing the network, which in turn builds on a substantial package of resurfacing funded during RIS1. This is additional to the money for retiring concrete pavement described above.
- Maintenance of drains and drainage, both to prevent flooding on the network and also to ensure that there is no environmental damage to surrounding areas.
- Repairs to earthworks, to preserve the integrity of the roads that run over them.
- Maintenance to electronic signs and gantries, and replacement of old and outdated lighting where needed.

RIS2 funds the first programme of true long-term planning for the maintenance of the SRN, considering the whole life impacts of the decisions we make. Thanks to this intervention, England's roads will run well for a generation to come.

# c. Operations

The work of Highways England is increasingly dominated by its operations. Whereas once road management was held to be a matter of tarmac and earthmoving, today it has a more sophisticated role centring on the everyday management of the road network. The traffic officers, patrolling the motorway network 24 hours a day, are the most recognisable part of Highways England to the travelling public.

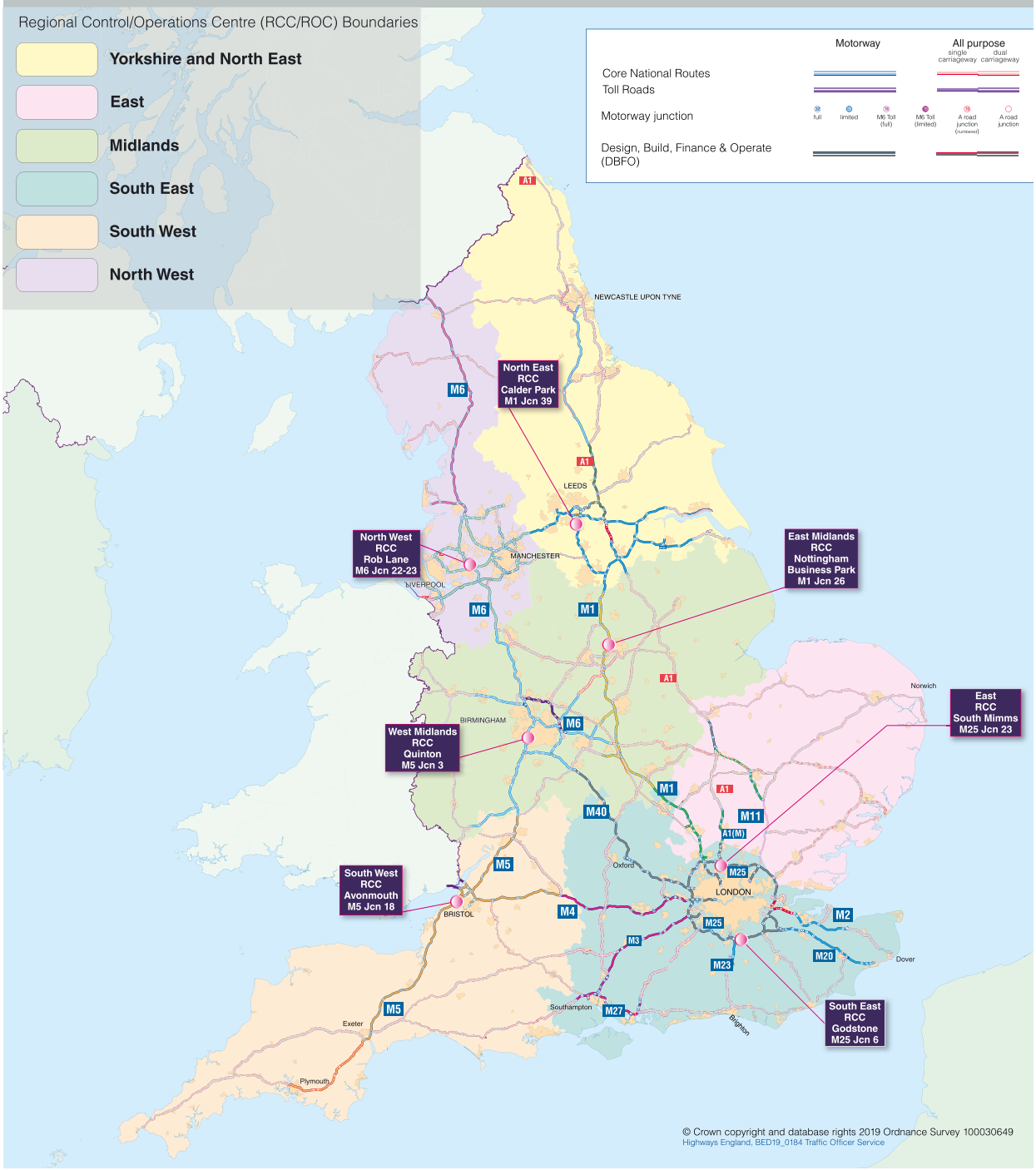
RIS2 continues to support the development of Highways England into this more operational role. The performance specification has set out what performance requirements have been placed on the organisation to increase the emphasis on live management of the network. This section outlines key financial investments that support this.

## Maintaining the traffic officer patrol

More than 1,000 traffic officers currently patrol key sections of the SRN, including all smart motorways. As smart motorways encompass more of the network, the traffic officer patrols will also expand their operations, supporting motorists on a wider range of roads.

highways england

## Traffic Officer Service



## Dealing with extreme weather

Extreme weather has the potential to cause extreme disruption to the road network. This is especially true in the north of England, and in exposed areas. In the first three months of 2018, the A66 was closed on seven occasions because of snow. It is expected that there will be an increase in the prevalence and severity of extreme weather in future years, with further adverse impacts on operations.

To help tackle this challenge, RIS2 will fund the replacement of the existing fleet of gritting trucks and snowploughs, making sure that our roads can keep up with the demands upon them. We also expect to invest in replacing the existing network of weather stations, to make sure that there is more accurate information available to manage weather-related incidents in real time. This should mean that Highways England is well-positioned to deal with whatever the weather will throw at it.

## Smart strategic roads

The long-term future of Highways England's network is not like its past. Once, the role of a roads operator was about the stewardship of inert masses of concrete and tarmac. Today, it is increasingly about the active management of traffic, the use of live data and the actions of staff on-road to deliver a real-time service.

This change in role leads to a shift in how the road is physically built, which will continue to evolve as the nature of future technology becomes clearer. It is still too early to talk with confidence about what the highway of the future will look like in full; but for RIS2 we know some features that are almost certain to be involved. These make sensible investments, and will increasingly become part of the backbone of Highways England's operations.

- We will continue to install high-capacity communications links as part of new road construction. The ability to send information up and down the road network will underpin the work of traffic control centres and on-road teams.
- We will continue to link up modern on-road technology into a coherent network. Highways England will need to draw out the synergies that this offers, including filling gaps in different networks to provide a continuously managed service to road users where relevant.
- We will ensure that traffic information data continues to be readily accessible to the public, creating the necessary back-office functions to ensure that the information gathered about the SRN connects readily to a wide variety of users.

We expect future RIS to continue investing in smart roads. We also expect other UK highways authorities to look to Highways England for leadership as they begin modernising their own networks. It is therefore vital that Highways England invests in the staff and skills necessary to become one of the world's most tech-savvy highway operators. Highways England will issue an updated *Design Manual for Roads and Bridges* before the start of RP2, and will keep this document under review with an eye to ensuring the early and effective incorporation of emerging technology.

We consider it likely that the next RIS, written with the benefit of five years' more knowledge about the future of mobility, will allow us to make wide-ranging commitments to the application of new standards. It is possible that radical technological change could mean this moment needs to come faster. RIS2 therefore reserves the right to accelerate a programme of technological adaptation, balanced by a reprioritisation of other planned activities so its impact is financially neutral for Highways England, without the funding settlement being formally reopened.

# d. Enhancements

Britain has long relied on its SRN. Key motorways, such as the M1, M6, M62 and M25, tie our nation together. Principal 'A' roads such as the A11 and A30 are critical links by which whole counties reach the wider world. Some roads, such as the A14 and the A34, have evolved to become critical links through which our nation trades with the wider world.

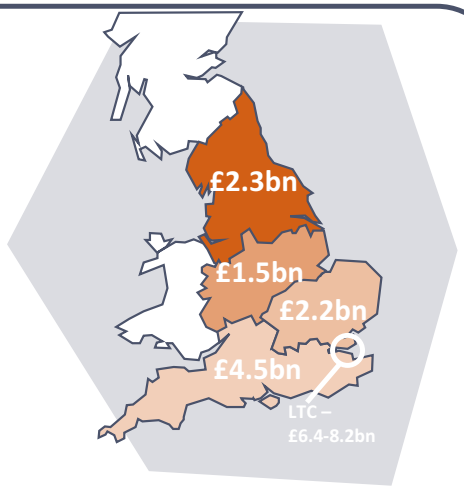
The demands we make of our roads continue to evolve and change; and we continue to invest in updating our network accordingly. We also continue to tackle historic problem spots, including many that past programmes have judged too difficult to fix. In order to do this, we are committing to some of the most ambitious projects since the creation of the motorway network.

## RIS2 will

### Start or complete £14.7bn of upgrades, including the Lower Thames Crossing

Begin planning 32 more projects – half of which by value are in the North and Midlands.

Transform our roads with the biggest roads project of the 21st century – the Lower Thames Crossing – and the biggest ever environmental improvement – the Stonehenge Tunnel




### Tie our nation closer together

| | |
|---|---|
| Belfast | Felixstowe |
| Glasgow | Dover |
| Kent | Essex |
| Cardiff | London |
| Cornwall | Bristol |

### Link the cities of the north and Midlands with modern, four-lane motorways

### Over 100 junctions upgraded

### More than 100,000 houses supported

### Improve links to 14 ports and 7 airports

# The nature of commitments in RIS2

A RIS is built around a series of investment commitments to specific infrastructure projects. Unlike historic infrastructure programmes, a RIS makes clear and accountable promises about which projects are expected to proceed and by when. This process for planning strategic road investment is amongst the most transparent and explicit in the world.

Whereas historic infrastructure programmes have promised action at an unspecified point in the future, RIS2 is built around a structure of commitments that expect projects to enter construction by 1 April 2025. The progress against this is monitored by the Department for Transport and ORR, with regular updates to Parliament.

***Project categorisation***

The projects listed in the investment plan are categorised as follows:

- **Under construction** – construction of this project is underway at the time of publication of RIS2.
- **Committed for RP2** – construction of this project is expected to start by 1 April 2025.
- **Smart motorways subject to stocktake** – the sequencing of smart motorway projects will be revisited in light of the smart motorway stocktake when it is concluded. Those that have yet to start major works or which are still in development may have to be rescheduled subject to the findings of the stocktake. Highways England will provide more detail on the status of individual projects later this year.
- **Pipeline for RIS3** – these are proposals that Highways England will develop during RP2 so that they could enter construction in RP3. Funding for construction of these schemes has not been committed.

We are committing funding to deliver the schemes named in RIS2 on the assumption that they continue to demonstrate a strong business case and secure the necessary planning consents. Nothing in the RIS interferes with the normal public planning consent process. They must remain deliverable and offer sufficient value for money to justify public investment. Where third party funding is required, progress will depend on this funding being provided.

We will hold Highways England to account on the delivery on the commitments set out in RIS2, but also on their ability to identify schemes that no longer meet the above tests and therefore need to be substantially reconsidered. Given the degree of analysis and design work already completed for RIS2 schemes, however, we would expect these circumstances to be minimal" with "the extent to which these occurs will be minimal.

***Dealing with change***

Such transparency about commitments creates challenges that do not exist in other parts of the infrastructure sector. Over the course of RP2 it is certain that there will be events – positive and negative – which could not be predicted when RIS2 was set. We aspire for most of these events to be positive, reflecting Highways England's constant efforts to generate efficiency.

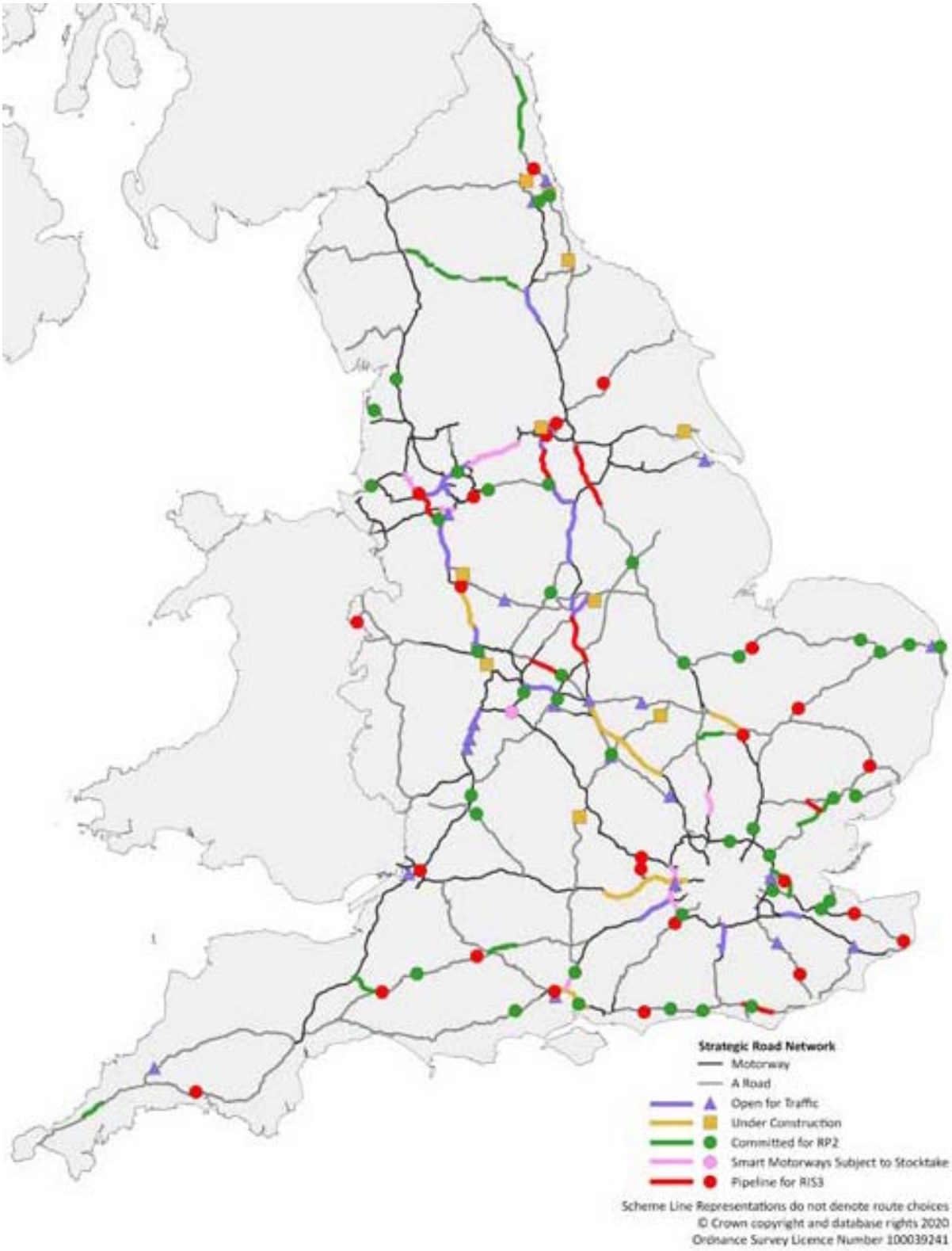
However, it is also possible that events entirely beyond the control of Highways England, such as the global price of oil, may affect the overall cost of the roads programme, and could lead to situations where the funds committed to 2025 in RIS2 are no longer sufficient to deliver all of the outputs listed in this document to the original timescales.

The funding settlement of a RIS is fixed, and defended in law, to ensure that long-term infrastructure plans are not sacrificed to fill short-term budget gaps. RIS2 continues this principle. As a result, unexpected financial pressures would necessarily have to be managed through the scheduling of work. Should government decide to specify new tasks for Highways England to deliver, this would need to be covered by additional funding.

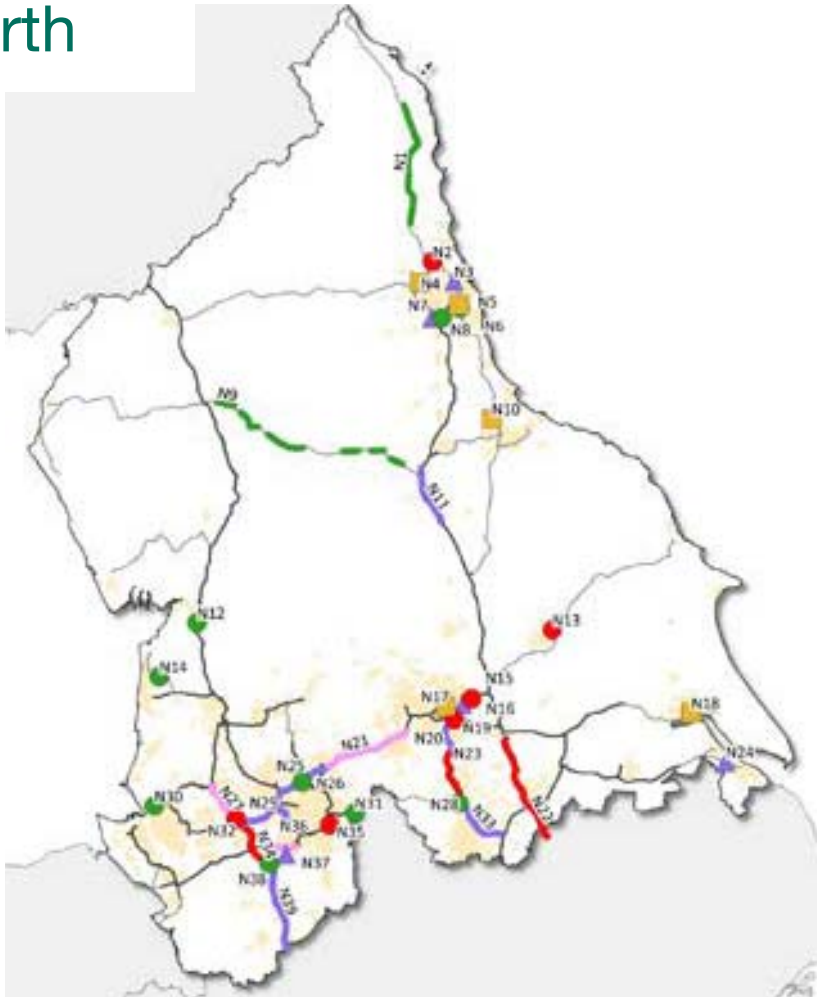
We have aimed to be transparent about this possibility when setting RIS2. Whereas RIS1 promised that its projects would start by the end of the period, we now wish to be clear that there is a possibility that external factors could delay the start of some projects beyond 2025. We also want to ensure that this operational reality does not undermine government's commitment to act – and that the promises made in RIS2 continue to stand regardless of the challenges met along the way. The commitments made in RIS2 should therefore be assumed to continue into RIS3, provided that the conditions above continue to be met.

The maps that follow show the locations of all schemes committed to by RIS1 and RIS2, and proposals in the pipeline for RIS3. RIS1 schemes that are already open for traffic are not described in this document. Proposals in the pipeline for RIS3 are listed in as part of the Strategic Research and Development section of the investment plan. Only schemes that are committed for investment during RP2 and planned smart motorway schemes (subject to current stocktake) are described in more detail in this section.

## Whole Strategic Road Network of Schemes



# The North




Urban Areas

SRN Motorways
SRN A-Roads

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**RIS1 Open for Traffic**

N3 A19/A1058 Coast Road
N7 A1 Coal House to Metro Centre
N11 A1 Leeming to Barton
N16 M1 Junction 45 Improvement
N20 M1 Junctions 39-42
N24 A160/A180 Immingham
N25 M60 Junction 8 to M62 Junction 20
N29 M62 Junctions 10-12
N33 M1 Junctions 32-35A
N37 A556 Knutsford to Bowdon
N39 M6 Junctions 16-19

**Under Construction**

N4 A1 Scotswood to North Brunton
N5 A19 Testos
N10 A19 Norton to Wynyard
N17 M621 Junctions 1-7
N18 A63 Castle Street

**Smart Motorways Subject to Stocktake**

N21 M62 Junctions 20 - 25
N27 M6 Junctions 21A-26
N36 M56 Junctions 6 - 8

**Committed for RP2**

N1 A1 Morpeth to Ellingham
N6 A19 Down Hill Lane
N8 A1 Birtley to Coal House
N9 A66 Northern Trans-Pennine
N12 M6 South Lancaster Growth Catalyst J33a (HIF)
N14 A585 Windy Harbour to Skippool
N26 M60/M62/M66 Simister Island
N28 A61 Westwood Roundabout
N30 A5036 Princess Way
N31 Mottram Moor Link Road & A57 Link Road
N38 M6 Junction 19

**RIS3 Pipeline**

N2 A19 North of Newcastle Junctions
N13 A64 Hopgrove
N15 M1 Leeds Eastern Gateway
N19 M1/M62 Lofthouse Junction
N22 A1 Doncaster-Darrington
N23 M1 Junctions 35A-39 Sheffield to Wakefield extra capacity
N32 M6 Junction 22
N34 M6 Junctions 19-21A
N35 Manchester South East Junction improvements

### A66 Northern Trans-Pennine

The A66 is a highway that ties our nation together. It connects Scotch Corner on the A1(M) with Penrith on the M6, making it the most important route to get from east to west for many of England's northern counties. Because of its position at the heart of the UK, it is the route of choice for many drivers in Scotland, Northern Ireland and the East of England who are looking to make long-distance journeys. For a manufacturer in Belfast, the A66 is the road that takes their goods to China.

Government first proposed dualling the A66 in 1946. Although piecemeal progress has been made over the intervening decades, through RIS2 we formally commit to complete this project. We have recently consulted on early-stage designs, allowing us to commence construction during the period covered by RIS2. Unlike similar upgrades in the past, we are planning this work as a single coordinated programme, without lengthy gaps between improvements at individual locations.

### *Under construction*

**A1 Scotswood to North Brunton** – narrow lane widening between junction 74 (Scotswood) and junction 79 (North Brunton) to allow three lanes of traffic through the junctions, and four lanes between some junctions.

**A19 Testos** – a grade separated junction between the A19 and A184, providing free-flowing access to the southern end of the Tyne Tunnel.

**A19 Norton to Wynyard** – widening of the A19 Billingham bypass to three lanes, between the A139 and the A689, including replacement of the concrete surface with low-noise surfacing.

**M621 Junctions 1-7** – junction enhancements and localised widening of sections of the M621 in central Leeds.

**M62 Junctions 20-25** – upgrading the M62 to smart motorway between junction 20 (Rochdale) and junction 25 (Brighouse) across the Pennines. Together with other smart motorways in Lancashire and Yorkshire, this will provide a full smart motorway link between Manchester and Leeds, and between the M1 and the M6.

**A63 Castle Street** – grade separation of the A1079 Mytongate junction in Hull to reduce congestion and improve safety; improvements to the surrounding roads including new pedestrian and cycle access across the A63.

### *Committed for RP2*

**A1 Morpeth to Ellingham** – upgrading multiple sections of the A1 to dual carriageway to provide continuous high quality dual carriageway from Newcastle to Ellingham, north of Alnwick.

**A19 Down Hill Lane** – significantly enhanced capacity on the junction between the A19 and the A1290 in Sunderland, supporting local plans for an International Advanced Manufacturing Park.

**A1 Birtley to Coal House** – route widening of the A1 south of Gateshead to dual-three lanes, including the replacement of the Allerdene Bridge. Linking with other schemes completed nearby, this will provide three lanes of capacity from the Metro Centre to the A194(M) interchange.

**A66 Northern Trans-Pennine** – upgrading the remaining six single carriageway sections of the A66 between the A1(M) at Scotch Corner and the M6 at Penrith, creating a continuous dual carriageway across the Pennines.

**A585 Windy Harbour to Skippool** – a new offline bypass of the village of Little Singleton, reducing the impact of traffic on the local community and removing a major bottleneck on the main road to Fleetwood.

**M60/M62/M66 Simister Island Interchange** – improvement of the intersection between the M60 (junction 18), M62 and M66 north of Manchester that improves the traffic flow on the M60.

**A61 Westwood Roundabout** – improvement to the roundabout between the A61 and A616 (north of Sheffield) to reduce congestion and improve the flow of traffic. This delivers the outcome originally expected of the A61 dualling commitment in RIS1.

**A5036 Princess Way –** access to Port of Liverpool: comprehensive upgrade to improve traffic conditions on the main link between the Liverpool docks and the motorway network.

**Mottram Moor Link Road & A57 Link Road** – providing a dual carriageway bypass around the town of Mottram near Manchester. This will also serve as an alternative route for traffic heading north-south on the A57.

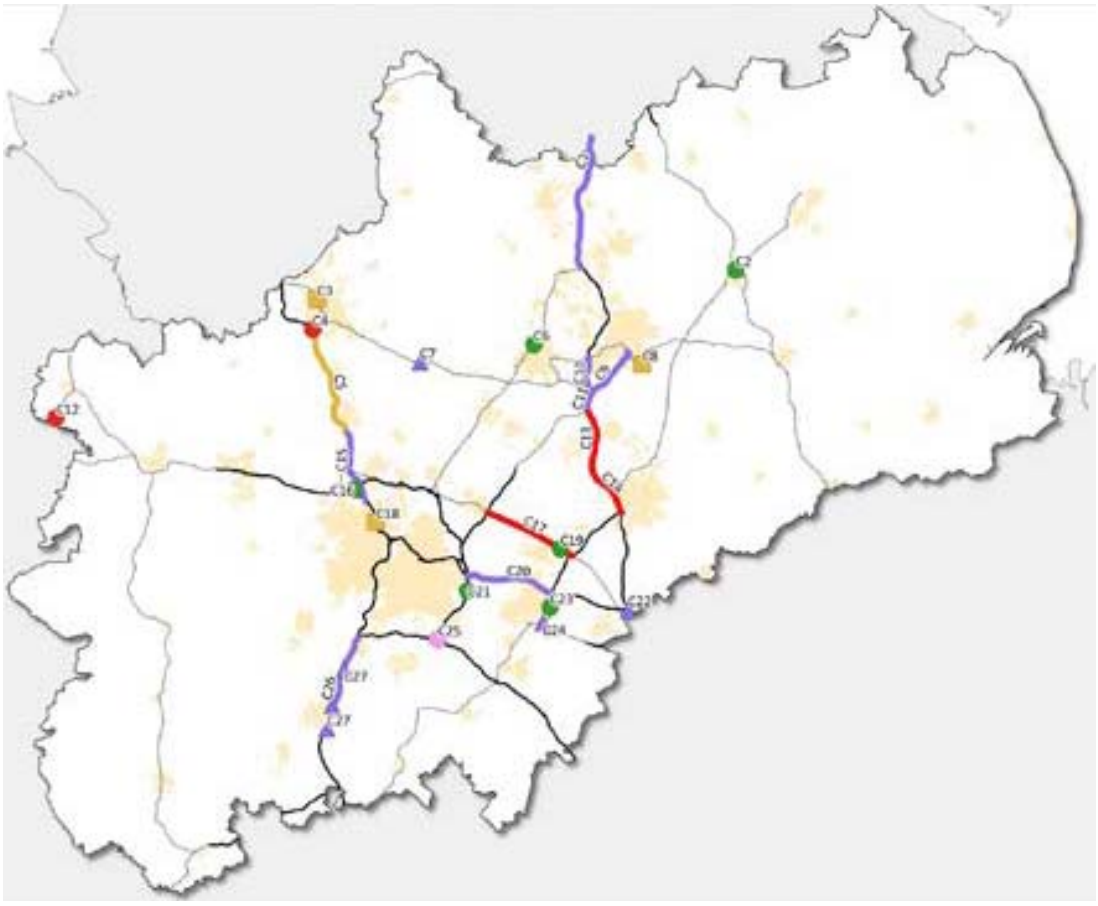
### *Smart motorways subject to stocktake*

**M62 Junctions 20–25** – upgrading the M62 to smart motorway between junction 20 (Rochdale) and junction 25 (Brighouse) across the Pennines. Together with other smart motorways in Lancashire and Yorkshire, this will provide continuous extra motorway capacity between Manchester and Leeds, and between the M1 and the M6.

**M6 Junctions 21A–26** – upgrading the M6 to smart motorway between junction 21A (M62 Croft Interchange) and junction 26 (Wigan).

**M56 Junctions 6–8** – upgrading the M56 to smart motorway between junction 6 (Manchester Airport) and junction 8 (A556). Together with other improvements nearby, this forms part of a comprehensive upgrade to the main gateway to both the south of the Manchester City region and the International Gateway at Manchester International Airport.

# The Midlands



Urban Areas

SRN Motorways
SRN A-Roads

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**RIS1 Open for Traffic**

| | |
|---|---|
| C1 | M1 Junctions 28-31 |
| C7 | A50 Uttoxeter (Phase A) |
| C9 | A453 Widening |
| C10 | M1 Junctions 24-25 |
| C11 | M1 Junctions 23A-24 |
| C15 | M6 Junctions 10a-13 |
| C20 | M6 Junctions 2-4 |
| C22 | M1 Junction 19 improvement |
| C24 | A45-A46 Tollbar End |
| C26 | M5 Junctions 4A-6 |
| C27 | M5 Junctions 5, 6 & 7 Junction upgrades |

**Under Construction**

| | |
|---|---|
| C3 | A500 Etruria |
| C5 | M6 Junctions 13-15 |
| C8 | A52 Nottingham Junctions |
| C18 | M6 Junction 10 |

**Committed for RP2**

| | |
|---|---|
| C2 | A46 Newark Bypass |
| C6 | A38 Derby Junctions |
| C16 | M54-M6 Link Road |
| C19 | A5 Dodwells to Longshoot |
| C21 | M42 Junction 6 |
| C23 | A46 Coventry Junctions |

**Smart Motorways Subject to Stocktake**

| | |
|---|---|
| C25 | M40 / M42 interchange |

**RIS3 Pipeline**

| | |
|---|---|
| C4 | M6 Junction 15 Potteries Southern Access |
| C12 | A483 Pant Llanymynech bypass |
| C13 | M1 North Leicestershire extra capacity |
| C14 | M1 Leicester Western Access |
| C17 | A5 Hinkley to Tamworth |

### A46 Newark Bypass

Midlands Connect has highlighted the role of the A46 in connecting the Midlands, running from Lincoln to Gloucestershire via Leicester and Coventry. Much of this road is already high quality dual carriageway, and by filling in key sections it would be possible to create a coast-to-coast highway without the need for major new road-building across open countryside.

The single greatest gap in this route is the A46 at Newark. An upgraded dual carriageway opened in 2012, but which stopped three miles short of the A1. We now propose to fill in this gap, eliminating regular traffic jams and creating a consistently good connection from the A1 at Newark to the M1 at Leicester. Coupled with the upgrades committed in RIS1, this means that the A46 dual carriageway will run unimpeded from Lincoln to Warwick.

We are also developing a proposal to improve the A1 in South Yorkshire. Together with the upgrade to the A46, this would effectively create a bypass to allow traffic to avoid the M1 around Nottingham, Sheffield and Leeds, opening up a high quality corridor for long-distance journeys to and from Scotland, the North East and Northern Ireland.

### *Under construction*

**A500 Etruria** – widening of the A500 between Wolstanton and Porthill junctions near the Etruria Valley development.

**M6 Junctions 13-15** – upgrading of the M6 to smart motorway between junction 13 (Stafford) and junction 15 (Stoke south). This provides continuous extra motorway capacity between Birmingham and Stoke-on-Trent.

**A52 Nottingham Junctions** – a package of measures to improve the junctions along the length of the A52 in Nottingham, including signalisation and junction reconstruction.

**M6 Junction 10** – additional capacity on junction 10, including the replacement of both bridges allowing the widening of the roundabout to four lanes.

### *Committed for RP2*

**A46 Newark Bypass** –improve the capacity of the single carriageway and junctions of the A46 at Newark, and provide better links to the A1.

**A38 Derby Junctions** – replacement of three roundabouts on the A38 in Derby with grade-separated interchanges, removing the last at-grade junctions on the A38 in the East Midlands and removing the conflict between local and strategic traffic.

**M54-M6 Link Road** – adding a north-facing access between the M54 and the M6 around junction 10A and 11.

**A5 Dodwells to Longshoot** – widening of a short section of the A5 near Hinckley, which carries the traffic of both the A5 and A47, to dual carriageway. This scheme will need to take into account evolving proposals for the A5 Hinckley to Tamworth.

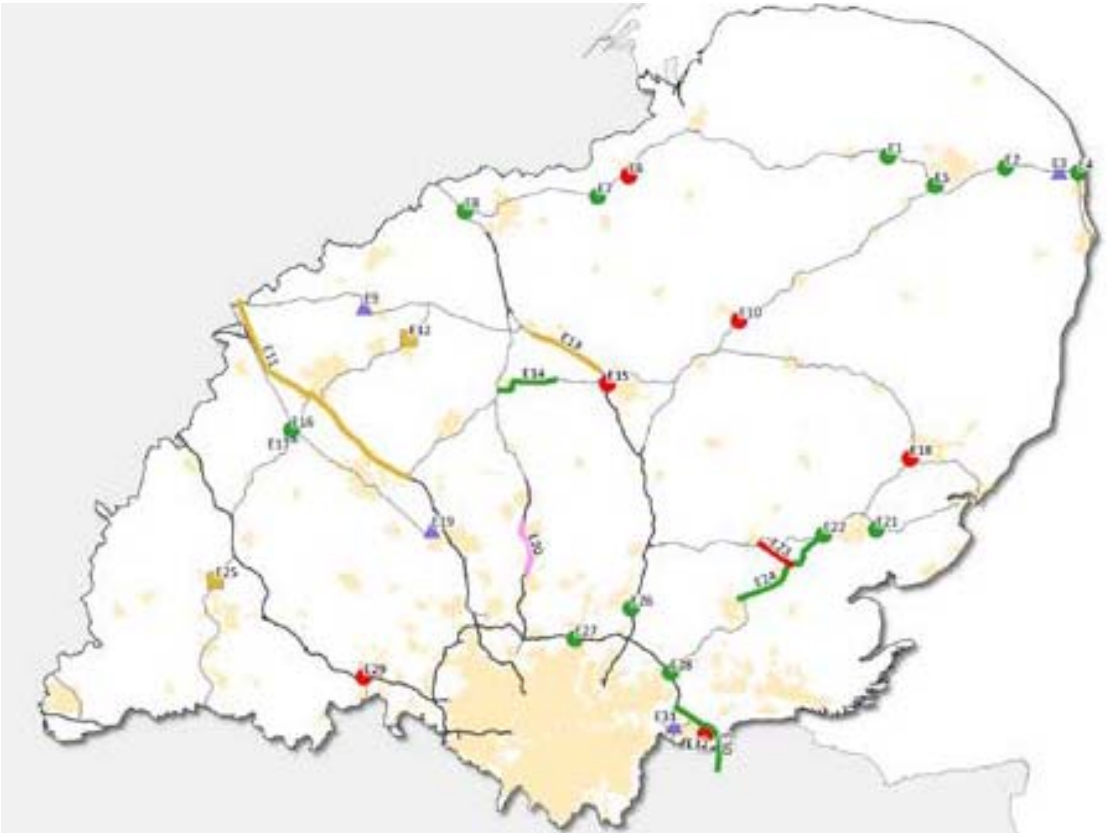
**M42 Junction 6 –** upgrade of the M42 junction 6 near Birmingham airport, allowing better movement of traffic on and off the A45, supporting access to the airport and preparing capacity for the new HS2 station.

**A46 Coventry Junctions –** grade separation of the Binley and Walsgrave roundabouts on the A46 near Coventry, upgrading the trunk sections of the A45/A46 between the M6 and M40 to a consistent standard.

### *Smart motorways subject to stocktake*

**M40/M42 Interchange –** introduction of smart motorways on the approaches to the M40/M42 interchange: the M40 from junction 16 and the M42 from junction 3 to 3A, plus the introduction of all-lane running to the existing section between junctions 3A and 4 on the M42.

# The East



SRN Motorways
SRN A-Roads

Urban Areas

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**RIS1 Open for Traffic**

E3 A47 Acle Straight
E9 A14 Kettering bypass widening
E17 A43 Abthorpe Junction
E19 A5 to M1 link (Dunstable northern bypass
E31 M25 Junction 30

**Under Construction**

E11 M1 Junctions 13-19
E12 A45/A6 Chowns Mill Junction
E13 A14 Cambridge to Huntingdon
E25 A34 Newbury to Oxford Enhancements

**Committed for RP2**

E1 A47 North Tuddenham to Easton
E2 A47 Blofield to North Burlingham
E4 A47 Great Yarmouth Junctions
E5 A47 Thickthorn Junction
E7 A47 Guyhirn Junction
E8 A47 Wansford to Sutton
E14 A428 Black Cat to Caxton Gibbet
E16 A5 Towcester Relief Road
E21 A120 Tendring / Colchester Borders Garden Community (HIF)
E22 A12 Colchester / Braintree Borders Garden Community (HIF)
E24 A12 Chelmsford to A120
E26 M11 Junction 7a
E27 M25 Junction 25
E28 M25 Junction 28
E30 Lower Thames Crossing

**Smart Motorways Subject to Stocktake**

E20 A1(M) Junctions 6 - 8

**RIS3 pipeline**

E6 A47/A1101 Elm Road Junction
E10 A11 Fiveways Junction
E15 M11 Junction 13 Cambridge West
E18 A12/A14 Copdock Interchange
E23 A120 Braintree to A12
E29 A404/M40 Junction 4 High Wycombe
E32 Tilbury Link Road

### Lower Thames Crossing

RIS1 proposed to investigate a new crossing of the River Thames, to relieve the heavy congestion at Dartford. This not only creates serious delays for those seeking to cross the Thames, but also serves as a barrier to the development of the Thames Estuary – an area with significant levels of deprivation.

In late 2018, Highways England outlined its detailed plans for a new tunnel between Essex and Kent, coupled with supporting link roads. This will provide three lanes across the Thames in each direction, almost doubling capacity east of the Blackwall Tunnel.

This project will also have a national impact, allowing freight traffic to the Continent to bypass Dartford, and have an uncongested route to Dover. We expect to investigate linked improvements on the A2 into Kent as part of the pipeline of work for the next RIS.

### *Under construction*

**M1 Junctions 13-19 –** upgrading the M1 to smart motorway between junction 13 (Milton Keynes South) and junction 19 (M6 Catthorpe interchange). Junctions 16-19 are already complete and fully open to traffic.

**A45/A6 Chowns Mill Junction –** upgrade of the Chowns Mill junction between the A45 and A6 in Northamptonshire.

**A14 Cambridge to Huntingdon –** a major upgrade to the A14 between the A1 and north Cambridge, widening the road to three lanes, providing a new bypass around Huntingdon, creating distributor roads for local traffic and remodelling key junctions along the route.

**A34 Newbury to Oxford Enhancements** – a collection of safety improvements to the A34 in Oxfordshire and north Berkshire, including improved laybys.

### *Committed for RP2*

**A47 North Tuddenham to Easton –** dualling of the single carriageway section of the A47 between Norwich and Dereham, linking together two existing sections of dual carriageway.

**A47 Blofield to North Burlingham –** upgrade of the A47 east of Norwich to fill a gap in the dual carriageway section between Norwich and the Acle Straight.

**A47 Thickthorn Junction –** improvement of the interchange between the A47 and A11, improving access into Norwich.

**A47 Guyhirn Junction –** creation of a new, larger junction linking the A47 and A141.

**A47 Wansford to Sutton –** dualling of the A47 between the A1 and the dual carriageway section west of Peterborough.

**A47 Great Yarmouth Junctions –** the scope of this scheme is under review in light of the new Great Yarmouth third river crossing. Originally, this proposed to improve the Vauxhall and Gapton roundabouts in Great Yarmouth; but the effects of the new crossing mean that these improvements no longer match the expected pattern of traffic. The scheme will be redesigned to take new circumstances into account.

**A428 Black Cat to Caxton Gibbet –** dualling of remaining single carriageway section between Cambridge and the M1, including three grade separated junctions: one at the junction of the A1 and A421 (Black Cat); a second at Cambridge Road / B1428 east of St Neots; and a third at the junction of the A428/A1198 at Caxton Gibbet. The Black

Cat interchange will provide free-flowing movements for traffic on the A1 and the A421/A428.

**A5 Towcester Relief Road –** support for a developer-led scheme providing an alternative route around Towcester in Northamptonshire.

**A12 Chelmsford to A120 –** widening the A12 to three lanes between junction 19 (north of Chelmsford) and junction 25 (A120 interchange). This may include delivery of additional improvements around the site of the Colchester/Braintree Border Garden Community, subject to support from the HIF. This scheme will need to take into account evolving proposals for the A120 Braintree to A12.

**M11 Junction 7a –** construction of a new junction to the east of Harlow, improving access to the surrounding areas and reducing traffic on the nearby junction 7. This project is being delivered by Essex County Council, subject to a funding arrangement with Highways England.

**M25 Junction 25 –** upgrade of the junction between the M25 and A10 at Cheshunt, providing greater capacity for traffic.

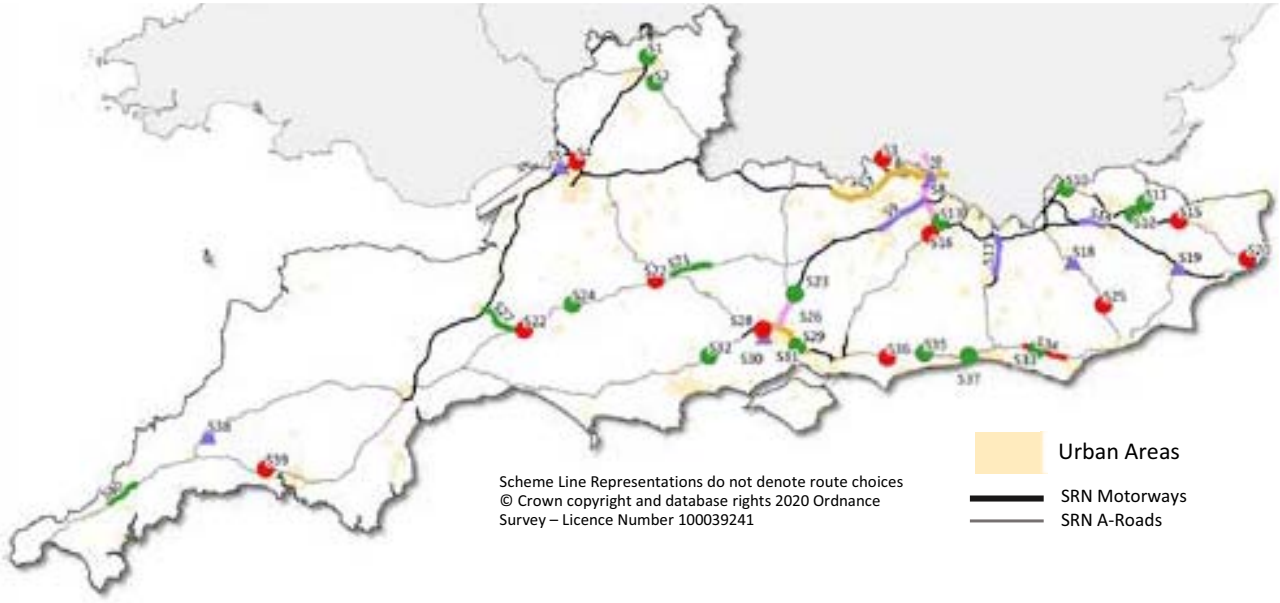
**M25 Junction 28 –** upgrade of the junction between the M25 and A12 in Essex, providing a free-flowing link from the northbound M25 to the eastbound A12.

**Lower Thames Crossing –** a new crossing of the River Thames between Kent and Essex, together with supporting roads linking to the M25, A13 and M2.

### *Under construction*

**A1(M) Junctions 6–8 –** introduction of smart motorway on the existing two-lane section of the A1(M) around Stevenage to provide a third lane of capacity.

# The South and West

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**Open for Traffic**

| | |
|---|---|
| S5 | M49 Avonmouth Junction |
| S8 | M4 Heathrow slip road |
| S9 | M3 Junctions 2-4A |
| S14 | M20 Junctions 3-5 |
| S17 | M23 Junctions 8-10 |
| S18 | A21 Tonbridge to Pembury |
| S19 | M20 Junction 10a |
| S30 | M271 / A35 Redbridge roundabout upgrade |
| S38 | A30 Temple to Carblake |

**Under Construction**

| | |
|---|---|
| S7 | M4 Junctions 3-12 |
| S29 | M27 Junctions 4-11 |

**Committed for RP2**

| | |
|---|---|
| S1 | M5 Junction 10 and Link Road (Gloucestershire) (HIF) |
| S2 | A417 Air Balloon |
| S10 | A2 Bean and Ebbsfleet |
| S11 | A249: Swale Transport Infrastructure (HIF) |
| S12 | M2 Junction 5 |
| S13 | M25 Junction 10 |
| S21 | A303 Amesbury to Berwick Down |
| S23 | M3 Junction 9 |
| S24 | A303 Sparkford to Ilchester |
| S27 | A358 Taunton to Southfields |
| S31 | M27 Junction 8 |
| S32 | A31 Ringwood |
| S33 | A27 East of Lewes Package |
| S35 | A27 Arundel Bypass |
| S37 | A27 Worthing and Lancing Improvements |
| S40 | A30 Chiverton to Carland Cross |

**Smart Motorways Subject to Stocktake**

| | |
|---|---|
| S6 | M25 10 – 16 |
| S26 | M3 9 – 14 |

**RIS3 Pipeline**

| | |
|---|---|
| S3 | A404 Bisham Junction |
| S4 | Severn Resilience package |
| S15 | A2 Brenley Corner |
| S16 | A3/A247 Ripley South |
| S20 | A2 Dover Access |
| S22 | A303 Phase 2 upgrade |
| S25 | A21 Safety Package |
| S28 | M27 Southampton Access |
| S34 | A27 Lewes to Polegate |
| S36 | A27 Chichester Improvements |
| S39 | A38 Trerulefoot - Carkeel safety package |

### A303 Amesbury to Berwick Down (Stonehenge Tunnel)

Stonehenge is a site of national and international significance whose setting has long been affected by the proximity of a major route to the South West. The construction of a two mile long tunnel as the road passes Stonehenge will begin in RP2. This will be the largest environmental improvement ever made to the UK road network and will transform the setting of the monument. It will also address one of the major pinchpoints for road users on the A303 corridor.

RP2 will also see work continue on planning further enhancements to meet the commitment to create a high quality connection to the South West. To allow a focus on the delivery of the Tunnel and to limit disruption to those who use this route, the next phases of construction are likely to begin as the Tunnel completes.

### *Under construction*

**M4 Junctions 3–12 –** upgrading of the M4 to smart motorway between junction 3 (Uxbridge) and junction 12 (west of Reading), linking Reading and Heathrow.

**M27 Junctions 4–11 –** upgrading the M27 to smart motorway between junction 4 (M3 interchange) and junction 11 (Fareham), linking with the smart motorway scheme on the M3.

### *Committed for RP2*

**A417 Air Balloon –** connecting the two dual carriageway sections of the A417 near Birdlip in Gloucestershire, taking account of both the environmental sensitivity of the site and the importance of the route to the local economy.

**A2 Bean and Ebbsfleet –** improvements to junctions on the A2 near Bluewater to enable major developments in the vicinity of Ebbsfleet. Construction is part-funded by a local developer.

**M2 Junction 5 –** additional capacity for the junction, through improvements to slip roads and enhanced junction approaches.

**M25 Junction 10 –** improvement to the Wisley interchange to allow free-flowing movement, together with improvements to the neighbouring Painshill interchange on the A3 to improve safety and reduce congestion.

**A303 Amesbury to Berwick Down –** construction of a twin-bored tunnel as the road passes Stonehenge, coupled with a dual carriageway bypass for Winterborne Stoke to link the existing dual carriageway at Berwick Down.

**M3 Junction 9 –** upgrade to the junction to allow free movement from the A34 to the M3.

**A303 Sparkford to Ilchester –** dualling of a single carriageway section of the A303, linking together the Sparkford and Ilchester bypasses.

**A358 Taunton to Southfields –** creating a dual carriageway link from the M5 at Taunton to the A303, incorporating upgraded stretches of the existing road into the SRN where appropriate.

**M27 Southampton Junction 8 –** additional capacity at junction 8 through improvements to the Windhover roundabout.

**A31 Ringwood –** widening of the A31 at Ringwood to three lanes, providing more capacity for local traffic using the road to cross the Avon, plus adjustments to the

nearby local road network to allow for improvements for pedestrians in Ringwood.

**A27 East of Lewes Package –** improvements to the A27 between Lewes and Eastbourne, including improvements to junctions around Eastbourne, dualling south of the Polegate roundabout and new facilities for cycling and walking.

**A27 Arundel Bypass –** replacement of the existing single carriageway road with a dual carriageway bypass, linking together the two existing dual carriageway sections of the road.

**A27 Worthing and Lancing improvements –** package of enhancements between Worthing and Lancing to improve the capacity and flow of traffic.

**A30 Chiverton to Carland Cross –** upgrading the A30 to dual carriageway north of Truro, connecting together the dual carriageway section around Bodmin with the dual carriageway Redruth bypass. This means that the A30 will be continuous dual carriageway from Camborne to the M5.

### *Smart motorways subject to stocktake*

**M25 Junctions 10-16 –** upgrading the M25 between junction 10 (A3) and junction 16 (M40) through a mixture of enhancements, including all lane running between junctions 15 and 16, as well as four-lane through-junction running between junctions 10 and 12.

**M3 Junctions 9-14 –** upgrading the M3 to smart motorway between junction 9 (Winchester/A34 interchange) and junction 14 (M27), linking with the smart motorway scheme on the M27. This includes improving slip roads at junctions 10 to 14 to align with the introduction of smart motorway (previously listed as two separate enhancement schemes).

# Housing Infrastructure fund

Schemes on the SRN that are funded under the HIF (listed below) are intended to be delivered alongside those listed above, but they are subject to different governance arrangements to those funded through RIS2, and they are not guaranteed by RIS2 should they not proceed with HIF funding.

**M6: South Lancaster Growth Catalyst** – junction 33a (Lancashire)

**A120: Tendring/Colchester Border Garden Community (Essex)**

**A12: Colchester/Braintree Border Garden Community (Essex)**

**M5 Junction 10 and Link Road (Gloucestershire)**

**A249: Swale Transport Infrastructure (Kent)**

# e. Designated funds

Highways England's responsibilities for the SRN go beyond the routine operation, maintenance and enhancement of its infrastructure. In particular, there are ongoing efforts to improve the environmental performance of the SRN and to do so in a way that exceeds basic expectations; there has to be a long-term programme to investigate innovative practices; there are many small-scale safety improvements that are integral to a well-functioning network; and there is the need to continue improving facilities for those that walk and cycle around the network.

To cover these areas and many more, there are a series of 'designated funds', which are reserved for key aspects of Highways England's activity. Unlike the enhancements programme, these are not specified in advance. Instead, Highways England will work together with key stakeholders to invest these funds over the course of RP2.

## Environment and Wellbeing fund

*A fund that supports environmental and community wellbeing outcomes across the SRN. It includes: retrofitting the latest environmental standards and green infrastructure solutions to existing roads; dealing with the effects that strategic roads have on nearby people, places, the historic environment and biodiversity; and making best use of the land around the road network. By funding work beyond business as usual, this fund should help: improve water and air quality; reduce noise pollution, flooding risks, risks posed to heritage assets, and the severance effect the SRN can have for neighbourhoods and wildlife; and, deliver improved environmental outcomes prior to routes being detrunked.*

The road network is about more than moving people and goods from one place to another. It has an environmental impact that affects its surroundings, particularly in places where the road predates our modern ideas of environmental protection. For many people, the most important relationship they have with the road network is as their neighbour. And for many more, there is a rightful concern about the importance of minimising the effects that roads have on the wider world, in terms of noise or emissions.

Modern roads are much better at minimising environmental impacts, using a mixture of sensitive design, modern materials and green infrastructure around the road network. Yet there is also more that can be done. The 'soft estate' that surrounds our busiest roads is full of environmental potential – sometimes highly attractive to wildlife given the absence of regular human intervention. And, as set out elsewhere in RIS2, the road network has an important role to play supporting the drive towards low-emission transport. This is not merely a matter of waiting for the vehicle fleet to shift, but taking direct action.

**A1(M) Catterick Village flood protection and wildlife habitat**

Highways England, in partnership with the Environment Agency and North Yorkshire County Council, delivered a jointly funded and designed scheme that provides a significantly improved standard of flood protection for around 165 homes and businesses in Catterick Village, and reduces the risk of flooding on the A1(M). The work included two large earth embankments, the diversion of Brough Beck and the construction of a new flow control structure. The scheme also encompassed improvements to a local bridleway and the creation of five hectares of new wildlife habitat.

## Users and Communities fund

*A fund for helping the SRN to provide a good service for all users and improve multi-modal connectivity. It includes: further cycle-proofing of the network; providing better facilities for pedestrians; support for buses and other transport sharing initiatives; integrating the SRN with other transport networks; improvements to lorry parking and other roadside facilities; and innovative mechanisms to deliver and improve information for road users and communities near to or impacted by the SRN. It also covers delivering small-scale, impactful, regeneration of built-up areas to restore social cohesion when routes are detrunked.*

When the first trunk roads were identified, many were no more than village high streets. The network has grown and evolved, but in places people still look out of their front door onto a strategic road. It is not appropriate to run such roads solely for the convenience of strategic traffic, and careful account must also be taken of those for whom a busy road is only a footstep away.

It is equally important to recognise that the users of roads are not vehicles, but people. Nor can these people be easily placed within a single, neat category. The management of the road network must take account of a diverse range of users. At one end, there are those who walk and cycle along or across the network; at the other, lorry drivers travelling hundreds of miles as part of their daily work.

This designated fund supports action to tackle the problems users and communities face currently. Examples of work that the RIS1 designated funds have covered in this area include 150 projects to provide a high-quality network for cyclists, and 90 new and 182 upgraded crossings that will enable non-motorised users to cross the SRN safely. We intend to see this fund assist bus users and improvements to lorry parking and other roadside facilities. It should also support multi-modal integration and connectivity around the SRN, working with Network Rail and bus and coach companies, for instance helping to fund bus services to business parks and monitoring of travel plans.

**Birchanger cycle path**

Highways England invested £800,000 to upgrade the Birchanger Cycle Path which links Bishop's Stortford to Stansted Airport carrying cyclists safely over the busy M11. Prior to the upgrade, the narrow path was difficult to navigate, especially for vulnerable users and involved cyclists commuting to the airport using the busy, multi-lane roundabout at J8 of the M11.

The work involved new signs, extra barriers and fences, clearance of overhanging vegetation and resurfacing to provide a safer, smoother journey for users. It also included embedding energy-efficient solar stud lights and 'give way' signage for horse riders and cyclists where there are concealed turns. The cycle path opened to the public in May 2018 and has received positive feedback from the local community.

## Innovation and Modernisation fund

*A fund that supports evolving mobility demands, new uses of data, and the continued development of new technology for the road network, as well as its wider introduction once concepts are proved, which is in addition to other conventional research budgets. Eligible activities include prototyping, real-world trials and on-network introduction. This fund should help the SRN adapt to maximise the opportunities by technologies such as automated vehicles. It will also support activities to deliver efficiencies and safety improvements from road design, construction and asset management.*

Transport is evolving. The vehicles on roads and the expectations of the people who use them are changing, and will change further. The way that the SRN is designed, operated and maintained, and the information supplied about travel options, will need to keep pace if users' experience is not to worsen.

The Innovation and Modernisation fund supports research into the latest technologies proposed for the road network. It is also of sufficient size to allow for new technology to be rolled out more widely once it is proven successful. Highways England's Digital Roads ambitions aim to reduce cost and improve safety, achieve better and more predictable journey times, and to improve air quality. This fund is intended to drive these ambitions forward.

We expect this fund to cover a wide range of activity, including efforts to prepare the SRN for CAVs, the testing of roadside connectivity standards and investigation into new safety technologies that can help with the active management of the road network. It can also support innovation in new materials and advances in plant and equipment to improve productivity. It is also intended to kindle new ways of doing things through strategic partnerships and opening the sector up to new players and ideas through the use of open competitions.

**UK Connected Intelligent Transport Environment (CITE)**

Highways England contributed £4.9million towards the £7.1 million CITE Project which aimed to test communication technologies and the way that vehicles and infrastructure might talk to each other in the future.

The project which was completed in November 2018, was led jointly by Jaguar Land Rover (JLR) and Visteon Engineering Services, working alongside many other partners. The trial culminated in a technology demonstration at Coventry Transport Museum and an on-road demonstration using a fleet of JLR connected vehicles. It tested so-called V2X or 'vehicle to everything' technology – enabling vehicles to communicate with each other and with infrastructure such as smart overhead gantry signs.

## Safety and Congestion fund

*A fund for local capital enhancements. This fund should help address pinchpoints where small-scale interventions can bring about significant improvements to congestion or safety, and also complete work begun under Highways England's RP1 Growth and Housing fund.*

Some of the most valuable improvements to the road network are not new bypasses or major interchanges. Some of the most powerful improvements can be relatively small projects, costing a few hundred thousand pounds, but which achieve great things through subtle tweaks to the network that we have. Small improvements, sometimes as seemingly inconsequential as the repainting of a set of road markings in a different pattern, can abolish jams or even save lives.

The Safety and Congestion fund gives Highways England the ability to deliver these small-scale enhancements. It exists to be deployed at the judgment of the local experts who know the network best.

**Tithebarn link road and bridge**

Working in partnership with developers and Devon County Council, Highways England has invested £6.2 million, of which £4.5 million came from designated funds in RIS1, to install a new link road to connect development sites near Exeter, together with a bridge for pedestrians and cyclists. The road was opened in April 2018, improving network resilience and easing congestion by providing a permanent alternative for traffic using the A30 link to the M5 at junction 29.

The pedestrian and cycle bridge offers a safe, connected route for non-motorised users travelling from the city centre to the Exeter and East Devon Growth Point. It complements the nearby Redhayes Bridge by creating a greater choice of direct routes over the motorway, encouraging local uptake in walking and cycling.

## The structure of the designated funds

Each designated fund is operated directly by Highways England. While it will report to wider government about where the money has been spent, and how it has delivered value for money, the operational decisions about how to invest these funds are a matter for Highways England.

| Fund | Expected total |
|---|---|
| Environment and Wellbeing | 345 |
| Users and Communities | 169 |
| Innovation and Modernisation | 216 |
| Safety and Congestion | 140 |

Experience of the designated funds in RIS1 has also shown that there is a powerful role for groups outside of Highways England, to help target funding in the places where it can do most good. Highways England has already taken steps to give such stakeholder groups a greater say in how funds are allocated, and this will continue in the period covered by RIS2.

As with the enhancement programme, the developing nature of events may mean that the original plans for the designated funds need to shift between now and 2025. For example, it is predicted that turnover of the vehicle fleet will mean there is a higher proportion of lower emission vehicles during RP2, leading to lower emissions of carbon, Nitrogen Dioxide and other pollutants. Were this to proceed either more slowly or faster than expected, it might lead to adjustments in the amount spent in one fund as opposed to another.

Similarly, the nature of Highways England's wider work may mean that it makes sense for smaller projects supported through these funds to move forwards or back to balance wider budgets. Such changes, if made, will be reported transparently by Highways England and after taking the advice of groups represented on the designated fund steering groups.

# f. Strategic research and development pipeline

As well as specifying investments to start in RP2, RIS2 also sets in motion the process for investing further into the future. By beginning to investigate the next wave of potential projects now, we can ensure that the next RIS can choose from a range of well-researched options.

In preparing RIS2, we have looked both to consider specific network needs, as well as to make longer-term plans to tackle long-standing problems or to create new economic opportunities. Our preparations for RIS3 will follow a similar path, with a mixture of specific scheme development, strategic studies that break big questions down into deliverable projects, and route strategies that analyse the performance issues and future pressures facing key routes.

The route strategies in particular can help with the prioritisation of interventions in a local area. For example, locally-led work in Cumbria has highlighted a number of potential improvements, including the A595 Whitehaven Relief Road and on the A590, and enhancements to principal local roads. The route strategy process provides the evidence to identify the best solutions and prioritising those for inclusion in a future RIS pipeline.

## RIS3 pipeline

Just as the new projects announced in RIS2 have been under development during the period covered by RIS1, the projects that will be promised in RIS3 need to enter development between now and 2025. This will involve proposals for the next RIS going through the early stages of the development process.

The development process is not a commitment to construct particular projects. Many proposals are likely to gather views from stakeholders and local people who might be affected by a potential proposal, including through a non-statutory consultation. For front-runners, this process could include taking a proposal to a full planning inquiry before the publication of the next RIS.

New proposals need to consider a wide range of impacts: not only what can be promised with certainty, but also where a proposal has the potential to support wider and more ambitious local plans for development. We will expect STBs to play an active role in articulating the benefits of proposals being examined in their area.

We also expect that where a proposal enables significant development nearby, the developer will contribute to the cost of delivering the scheme. There is also potential for funding from other sources to support a developing proposal. Funding contributions will make a significant difference to the likelihood of government choosing to bring forward a proposal to the next stage, and ultimately to commit it as part of the next RIS. We value the role that local partners, including local authorities, mayoral and combined authorities and LEPs, have played in the past in marshalling such packages of support.

As a proposal is developed, our understanding of it is likely to change. In some cases, this may demonstrate a deeper or more urgent need for a particular piece of work, which may lead to it being prioritised for rapid delivery. In other cases, it may demonstrate that the case for investment is not strong enough to justify spending public money at a large scale, or that the same outcome can be achieved more effectively through alternative means. Government will commit to the delivery of successful proposals through the publication of RIS3.

### The North

A19 North of Newcastle Junctions

A64 Hopgrove

M1 Leeds Eastern Gateway

M1/M62 Lofthouse Interchange

M6 Junctions 19-21A Knutsford to Croft extra capacity

M1 Junctions 35A-39 Sheffield to Wakefield extra capacity

A1 Doncaster to Darrington

M6 Junction 22

Manchester South East Junction improvements

### The Midlands

M6 Junction 15 Potteries Southern Access

A483 Pant-Llanymynech Bypass (in cooperation with the Welsh Government)

M1 North Leicestershire extra capacity

M1 Leicester Western Access

A5 Hinckley to Tamworth (**)

### The East

A47/A1101 Elm Road Junction

A11 Fiveways Junction

M11 Junction 13 Cambridge West

A12/A14 Copdock Interchange

A120 Braintree to A12 (*)

A404/M40 Junction 4 High Wycombe

Tilbury Link Road

## The South and West

Severn Resilience Package

A404 Bisham Junction

A2 Brenley Corner

A303 Phase 2 upgrade

A3/A247 Ripley South

A21 safety package

A2 Dover Access

A27 Lewes to Polegate

A27 Chichester improvements

M27 Southampton Access

A38 Trerulefoot-Carkeel safety package

* The A120 Braintree to A12 proposal is currently affected by outstanding funding contributions related to the development of the Colchester/ Braintree Border Garden Community and contributions from local authorities. Subject to decisions in these areas, the scheme may become committed for delivery.

** In cooperation with work funded by the Ministry of Housing, Communities and Local Government on the A5 Transport Corridor.

## Strategic studies

Strategic studies are a method to tackle problems that are too large to be resolved through one single project; or where the impacts of action are more complex or conditional, and must be considered in ways that are not standard. The development of RIS2 has used this tool to consider what can be done at some of the most difficult points on the network, and the findings have led to RIS2 committing to complex projects. In particular, the study into Northern Trans-Pennine links has been endorsed by the Government, and RIS2 commits to delivering the coordinated dualling of the A66.

Strategic studies also serve as a useful mechanism to find opportunities to link new infrastructure with substantial development. This is particularly relevant for the Government's ambitions for growth and housing. In some cases, strategic studies can be expected not to create a proposal for infrastructure, but to identify opportunities where wide-ranging local development can cohere around plans for a single piece of infrastructure.

The first generation of strategic studies have already created an ambitious programme of forward work, which will affect Highways England's forward plans into RIS3 and RIS4. The scale of this work, coupled with the potential for further proposals to evolve from other strategic studies, limits the extent to which we are commissioning new strategic studies at present. However, we have identified some areas where new studies can serve a useful purpose.

### Existing strategic studies

- **M60 Manchester North West Quadrant** – The North West Quadrant of the M60 is one of the busiest roads in the North, providing for both local and strategic traffic. The current constraints on the route have negative impacts on both users and local residents. Working closely with Transport for the North and Transport for Great Manchester, our study has so far supported the importance of the Simister Island Interchange in mitigating some impacts and there is now a committed scheme in RIS2. However, the transformational options identified by the study would have significant adverse impacts on local people and communities, and overall would not provide value for money. The study will therefore continue to identify packages of smaller schemes that can be developed through RP2. Working closely with Transport for Greater Manchester, we will complete a parallel local study which has sought to identify if meaningful relief can be delivered through improvements to public transport or to the local road network.
- **Trans-Pennine Tunnel** – Manchester and Sheffield are not connected directly by a high-quality road. Work during RIS1 has shown that traffic between the two cities is one fifth of that between Manchester and Leeds. However, the presence of the Peak District National Park means that any action to correct this must take full account of potential environmental consequences. We will work in partnership with Transport for the North, local highways and national park authorities to finalise whether high-quality but cost effective connections can provide an appropriate balance between the levelling up of the economy and the environmental impacts on a valued and protected landscape.
- **A1 East of England** – The A1 in Bedfordshire is some of the oldest dual carriageway on the SRN, and has

profound impacts on the people who live on or near to it. It also creates a limit on how much growth the area can absorb without placing existing infrastructure under visible strain. Our existing study shows that congestion and safety issues on the route are not substantial enough in their own right to justify the full costs of moving the road to a new, more appropriate location. Substantial plans for local development (as proposed by the National Infrastructure Commission) has the potential to change this, and further work on the project will be considered if development becomes likely.

- **Oxford to Cambridge Expressway** – Oxford to Cambridge Expressway – the Oxford-Cambridge Arc is already home to some of the most productive towns and cities in the country. The Government's ambition is for further growth within the Arc that will help make it a world class economic hub, and delivering the right infrastructure is vital to support this. The Government has investigated the potential for a new high-quality link road between the M1 and M40 which could support this growth and examined the costs and benefits of a range of options, taking account of the views of local authorities and residents in the Arc. We are now pausing further development of the scheme while we undertake further work on other potential road projects that could support the Government's ambition for the Oxford-Cambridge Arc, and benefit people who live and work there, including exploring opportunities to alleviate congestion around the Arc's major economic centres such as Milton Keynes. We will work with the Ministry of Housing, Communities and Local Government and local partners on the proposed Spatial Framework to identify the role transport can play alongside the proposed economic and housing growth ambitions for the Oxford-Cambridge Arc.

- **M25 South West Quadrant** – The M25 between Junctions 10 and 16 is the busiest section of road in the UK and our study has considered how congestion can be relieved on this route. The study recommends against conventional widening of the existing road and has sought to find other ways of reducing pressure on the motorway. It assessed whether wider transport measures could have a role to play in easing congestion on this section, but has indicated that these are insufficient to meaningfully improve the road's performance. We have identified options for getting more capacity out of the existing M25, but in the long-term it may be that to reduce congestion significantly new infrastructure off the existing line of route would prove necessary. We will now look to review and consider these options further taking full account of any effects on surrounding communities.

### New studies

- **Central Pennines** – This new study was announced in March 2019 to consider how road connections from the eastern end of the M65 in Colne could be improved. The study is considering if there maybe potential to better connect communities in east Lancashire and West Yorkshire, provide more resilient links to Leeds Bradford Airport and between the M6 and the A1(M), relieving the M62. The study is looking at what the issues are before assessing if there are plausible, cost effective options.

- **M4 to Dorset Coast** – There are few north-south connections across the South West of England. The present strategic road for this area is a mixture of the A36 and A46, via Bath, Warminster and Salisbury. Local authorities in the area have suggested that there is a strategic case for adopting an alternative corridor – the A350 – as the main strategic route for the area; and then beginning a coordinated programme of upgrades to provide a high-quality route linking the M4 to the Dorset Coast including Bournemouth and Poole, with its economically-important port facilities. This raises a number of related questions, which are best considered together as part of a strategic study. We expect that this study will identify which corridor provides the main strategic route for the area; may recommend the trunking and detrunking of key routes; and may identify priority investments in the area that can be taken forward after the dualling of the A303/A358 is complete.
- **Role of the Urban SRN** – As mayoral and combined authorities develop strategies and working arrangements for their transport and environmental activities in many of our urban centres, an important question emerges about how the SRN and Highways England can play their part most effectively in those places. In RP2, Highways England will undertake a study into the role of the urban SRN, balancing the desire to better integrate these roads with local planning and transport operations while not adversely impacting on their national strategic role. This study will consider options such as improved collaboration on operations and changes in road ownership.

In considering where to locate new strategic studies, we have taken into account the developing role of STBs. These organisations, each at a different stage of maturity, are increasingly carrying out work similar to the strategic studies commissioned by RIS1, and in some cases have requested that they take the lead in carrying out work of this kind. For this reason, RIS2 looks to the existing studies on key corridors carried out by Transport for the North and Midlands Connect when planning for their respective areas, instead of commissioning studies to re-examine the same questions.

# Statement of funds available

**This Statement of Funds Available outlines the resources available to Highways England in delivering the outputs listed in the investment plan and performance specification, as well as discharging all responsibilities set out in Highways England's Licence and wider statute.**

As announced in 2015, RIS2 will be funded from the NRF, meaning that our most strategically important roads are now backed by a dedicated funding source provided directly by the users of the network.

## RIS2 Statement of Funds Available

Funding is outlined from 2020-25, a period known for financial purposes as RP2. This covers the totality of funding government expects to give Highways England in order to deliver the objectives of RIS2.

| Item (£000's) | | 2020/21 | 2021/22 | 2022/23 | 2023/24 | 2024/25 | RP2 Total |
|---|---|---|---|---|---|---|---|
| Operations, maintenance renewals and business costs | Resource | 1,201 | 1,160 | 1,199 | 1,221 | 1,293 | **6,074** |
| | Capital | 1,098 | 1,145 | 1,113 | 1,276 | 1,193 | **5,825** |
| Capital enhancements | | 2,475 | 3,076 | 2,980 | 2,885 | 2,702 | **14,118** |
| Designated funds | | 159 | 169 | 174 | 184 | 184 | **870** |
| Preparing for RIS3 | | 39 | 59 | 107 | 142 | 124 | **472** |
| **RIS2 Total** | | **4,973** | **5,609** | **5,572** | **5,708** | **5,496** | **27,358** |

The total funding that Highways England will receive during RP2 to deliver the outputs and outcomes listed in this document will be £27.4 billion – greater than the expectation of £25.3 billion set out in the Draft RIS.

Within this framework:

- Total funding allocated to designated funds will continue to be ring-fenced, in line with practice in RIS1.
- There is a risk reserve which will act as a flexible pot, allowing Highways England to respond to unexpected events without putting the delivery of its programme at risk.
- Highways England has the flexibility to bring forward or defer up to 10% of its capital funding each year, to ensure that the capital funding profile is efficient. Therefore, the profile of expenditure may be subject to change if this arrangement is utilised. Updated totals will be published annually in Highways England's Delivery Plan.
- Operations and maintenance spend includes funding for the various protocol agreements that exist outside of RIS2 to deliver key roads services on behalf of central government (such as providing technical advice on construction standards)

## Further funding

Not all items in RIS2 are funded directly from the Statement of Funds Available. For example:

- Highways England continues to deliver road enhancements in partnership with developers and local partners. In certain situations, particularly those where an enhancement predominantly benefits a

new development, Highways England will be expected to secure suitable contributions from key beneficiaries.

- Highways England is likely to deliver improvements to the network as part of other government programmes. This could include the HIF.
- Some protocols are funded outside of the RIS.

The exact amounts of funding will be subject to negotiation between Highways England and other parties, and may result in further agreements alongside RIS2.

## Efficiency savings

The creation of Highways England and the establishment of a long-term funding cycle was justified in part by the substantial efficiency savings that it was expected to produce. Highways England is on track to deliver £1.212 billion of savings during the period covered by RIS1, and is expected to deliver £2.304 billion of savings during the period covered by RIS2.

As discussed in the performance specification, the savings made as part of the efficiency target will continue to be assured by ORR. Performance against this target, as with other key indicators of performance, will be publicly reported in ORR's annual reports on Highways England's performance.

This means that in its first ten years, the creation of Highways England is expected to result in savings worth £3.5 billion – the equivalent of all of the improvements we have made in RP1 and are making through RIS2 to the A1, M6 and A30.

## Protocols

Protocols are a way of managing additional functions or activities which are not core to Highways England's role as a strategic highways company. Highways England is therefore instructed to undertake the following protocols, managed within its overall funding envelope. The current protocols cover:

### Salt stocks

Highways England will continue to maintain a strategic salt stock as an emergency reserve for it and local highway authorities for winter maintenance. It will also manage the allocation and distribution of salt to local authorities.

### Abnormal loads

Highways England will continue to be responsible for authorising the movement of abnormal loads within Great Britain and for planning routes for the movement of the largest and heaviest abnormal loads within England and Wales. This includes the management and maintenance of the electronic service delivery system currently used to plan and approve the routes of all abnormal loads on behalf of the Secretary of State.

### M6 Toll

Highways England will be responsible for fulfilling the Government's side of the M6 Toll concession arrangements, including matters relating to road signage and incident liaison.

### Severn River Crossing

Highways England will continue to operate and maintain the Severn Bridge on behalf of the Secretary of State. The assets which comprise the Severn River Crossing were not transferred to Highways England with the rest of the SRN. For the majority of RP1, a private concessionaire undertook most of the operational and maintenance activity, funding this from the toll income they received. Once the concession ceased, all operations and maintenance activity has been undertaken by Highways England. Funding for this, in the latter part of RP1, was provided through the protocol which continues into RP2.

### Dart Charge

Highways England will continue to performance manage and administer the collection of the Dart Charge and enforcement management services using agreements between the Secretary of State and appointed contractors and service providers. Income from Dart Charge accrues directly to the Department.

### Standards and Guidance

Highways England will continue to develop, maintain and publish the standards and specifications used for the planning, design, construction, maintenance and operation of the SRN. Where these publications also meet the needs of the devolved administrations of the Welsh Assembly Government, Transport Scotland and the Department for Regional Development Northern Ireland, they will be developed with their support. These documents are also available for use by other highway authorities and infrastructure operators, both nationally and internationally.

# Glossary and References

## Abbreviations of terms used

**APTR** – All-Purpose Trunk Road; an 'A' road on the strategic road network.

**CAV** – Connected and Autonomous Vehicle

**DBFO** – Design, Build, Finance and Operate; a form of project financing in which a private entity is awarded a concession to design, build, finance and operate a piece of infrastructure for a period of time.

**HGV** – Heavy Goods Vehicle

**HIF** – Housing Infrastructure Fund; the £5.5 billion government fund managed by the Ministry of Housing, Communities and Local Government to support infrastructure schemes where these can unlock new housing developments.

**HS2** – High Speed Two rail line

**iRAP** – International Road Assessment Programme; the programme provides tools for assessing and improving road safety performance.

**KPI** – Key Performance Indicator

**MRN** – Major Road Network; the most important local roads, which are eligible to receive funding from the NRF for enhancements.

**NRF** – National Roads Fund; a funding stream that hypothecates Vehicle Excise Duty receipts in England for investment in the most strategically important roads.

**NRUSS** – National Road Users' Satisfaction Survey

**ORR** – Office of Rail and Road; the independent highways monitor

**PI** – Performance Indicator

**RIS** – Road Investment Strategy; government's statement of its long-term vision for strategic roads, what it expects Highways England to deliver in the next road period, and the funding it will make available for that purpose. RIS1 was published in 2014; this document is RIS2; RIS3 is expected to be published in 2024.

**RP** – Road Period; the period of time to which a RIS applies. RP1 is financial years 2015/16 to 2019/20 inclusive; RP2 will be 2020/21 to 2024/25; and RP3 will commence with 2025/26.

**RTF18** – Road Traffic Forecasts 2018

**SRN** – Strategic Road Network; the motorways and main 'A' roads managed by Highways England on behalf of government.

**SRUS** – Strategic Roads User Survey; successor to NRUSS developed and delivered by Transport Focus.

**STB** – Sub-national Transport Body; groups of local authorities with transport responsibilities working together to improve regional connectivity, unlock economic growth and enhance quality of life in their area. STBs develop a transport strategy which promotes and encourages sustainable, safe, integrated, efficient and economic transport facilities and services to, from and within the area of the STB. Current STBs are: Transport for the North; Midlands Connect; England's Economic Heartland; Transport East; Transport for the South East; Western Gateway; and Peninsula Transport.

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| Page | Source | Table |
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## Appendix CL2.22

## National Infrastructure Strategy (2020)

# National Infrastructure Strategy

## Fairer, faster, greener

HM Treasury

1304

# National Infrastructure Strategy

Presented to Parliament
by the Chancellor of the Exchequer
by Command of Her Majesty
November 2020



CP 329

# Contents


**Foreword** 6

**Executive Summary** 8

**Introduction** 16

**Chapter 1**
Recovery and rebuilding the economy 20

**Chapter 2**
Levelling up the whole of the UK 26

**Chapter 3**
Decarbonising the economy and adapting to climate change 46

**Chapter 4**
Supporting private investment 66

**Chapter 5**
Building faster, better and greener 78

**Chapter 6**
Conclusion and next steps 94



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# Foreword

## Fairer, faster, greener

For decade after decade, governments of every political stripe have failed to invest enough in the UK's regions and nations. It is one of the reasons why the quality of our national infrastructure has fallen behind that of other countries. This Strategy will change that.

In almost my first words as Prime Minister, I promised to unite our country by physically and literally renewing the ties that bind us together. I promised to unleash the productive power not just of London and the South East, but of every corner of England, Scotland, Wales and Northern Ireland. I want to bring hope and opportunity for each part of the UK. Levelling up is my government's core purpose.

Our roads and our railways and our full-fibre cables join us together as one nation - the thigh bone connected to the hip bone, connected to the back bone, connected to the shoulder bone - but our national anatomy is creaking. Some of our organs, the cities, are congested and need relief. Some of our towns and villages, the largest part of the national body, are neglected and need attention. Some of our spine, the inter-city road and rail network, is old and needs renewal.

This document sets out our plan for a renaissance, backed by hundreds of billions of pounds of public and private investment. It is a response to the outstanding work done by the National Infrastructure Commission in assessing what the country needs. We will build that infrastructure, and redress long-standing inequalities, particularly in transport, between different parts of the UK. In recent years, we have spent heavily on the rail and road networks of London and the south-east, whose prosperity benefits us all. The fruits of that investment - Thameslink, Crossrail, new trains on the Underground, the future Lower Thames Crossing to relieve the M25 - will serve our economic engine well for many years.

But in the period covered by this strategy, we will significantly shift spending to the regions and nations of the UK. On our major A roads and motorways, two-thirds of our upgrades are outside south-eastern England, including dualling the A303 to the south-west and completing the first trans-Pennine dual carriageway in fifty years.

In public transport, all but one of the major new capital projects in the next few years will be outside the south-east. Northern Powerhouse Rail will connect Leeds and Manchester, and we will help make bus and rail networks in those and other city regions as good as Greater London's.



I know, too, that a multitude of smaller, local projects - better buses, and bypasses, and new stations, and cycle lanes - will do at least as much good as the megaschemes, and help more people. This strategy funds them too. We will restore many of the rail services lost in the Beeching cuts, pump money into local roads, and are providing £5 billion of extra funding to improve buses and cycling across the country, again on the model of London.

The Union Connectivity Review will examine new ways to bind together our United Kingdom, improving the links between our four nations. We have changed the Green Book, the government's guidance on how to assess potential investments, to help us address regional and Union imbalances.

And our environmental agenda, set out in our recent ten-point plan, is fully reflected in this Strategy, with ambitious commitments on energy, decarbonisation and clean economic growth driving us towards net zero in 2050. Our new industrial revolution will create and support up to 250,000 green jobs.

About half of all infrastructure spending is private, especially in energy, water and telecoms. We will reduce policy uncertainty that holds back investment and create a new national infrastructure bank to co-invest with private-sector partners. It will be available to metro mayors and local authorities. And it will be headquartered in the North of England: the place where the first infrastructure revolution, and arguably the modern world, was born.

The projects in this strategy, including £27 billion of public funding next year, will create wealth and thousands of jobs to repair some of the scars from the pandemic. We must build back better, not the same as before.

So we also start to ask how we should answer the new challenges caused by COVID-19, such as increased demand for roads; and how we can use the new levers the crisis has given us. We have learned, since March, that we can build new hospitals and testing labs more quickly than we ever imagined. We will use that experience to deliver motorway junctions, railways, and power stations more quickly too. We are in the buyer's market of a lifetime; we will use our weight as a major client to drive best practice in procurement.

In a world likely to be working less from the office, our massive gigabit-capable broadband programme looks more important than ever. It has enormous potential for levelling-up: with cheaper property, more relaxed lifestyles and superb internet connections, previously left-behind towns could become homeworking hubs.

Yet I also deeply believe in the future of cities and of other places where people can meet each other, challenge each other, spark off other people and create those magical flashes of creativity and invention. After months trapped on endless flickering video-conferences, we will want face-to-face contact more than ever. Some of our infrastructure needs will change because of COVID-19. Many will not.

Infrastructure will not, of course, level up Britain on its own. We must work on skills, on research and on innovation to create new, wealth-generating clusters - new Cambridges, new Thames Valleys - across the country. But this Strategy will put the calcium in our national bone structure and the collagen in our national skin tissue.

**Boris Johnson**
**Prime Minister**

# Executive Summary

Infrastructure underpins the economy. Transport, digital, energy and utility networks are vital for jobs, businesses and economic growth. But they also have a profound impact on people's daily lives.

The government wants to deliver an infrastructure revolution: a radical improvement in the quality of the UK's infrastructure to help level up the country, strengthen the Union, and put the UK on the path to net zero emissions by 2050.

This Strategy sets out the government's plans to deliver on this ambition. It is the first of its kind: **rooted in the expert advice of the highly respected National Infrastructure Commission (NIC) and responding to its ground-breaking 2018 assessment of the country's infrastructure needs.**

**Infrastructure is long-term.** Decisions taken today on new rail lines, power plants, or road upgrades, will affect lives and livelihoods for decades to come. But infrastructure investment also has an important short-term role to help support jobs and stimulate the economy. This Strategy brings together the government's long-term goals with the short-term imperative to rebuild the economy following the COVID-19 pandemic.

COVID-19 continues to pose a huge challenge to the UK, as it does with every other major global economy. **The government will do whatever it takes to ensure the economy recovers as swiftly as possible.** In the summer, the government brought forward £8.6 billion of investment to support jobs during the pandemic. This Strategy sets out the government's plans to go further, to drive a strong and jobs-rich recovery.

**As the government helps the economy to recover it will also seek to address the long-term issues that have held back UK infrastructure**. These issues include 'stop-start' public investment, insufficient funding for regions outside of London, slow adoption of new technology, policy uncertainty that undermines private investment, and project delivery plagued by delays and cost overruns.

This Strategy sets out how the government will address these issues and do things differently: how it will build back fairer, faster and greener. It describes how the government will:

- **Boost growth and productivity across the whole of the UK, levelling up and strengthening the Union:** the government wants to level up communities and nations across the UK through investment in rural areas, towns and cities, from major national projects to local priorities;
- **Put the UK on the path to meeting its net zero emissions target by 2050:** bold action is needed to transform the UK's infrastructure to meet net zero and climate change commitments. The government will continue to decarbonise the UK's power, heat and transport networks – which together account for over two-thirds of UK emissions - and take steps to adapt to the risks posed by climate change;
- **Support private investment:** the UK has a proud record of attracting private investment into its infrastructure. But the government recognises investors have faced uncertainty in the past few years. This Strategy – and *the Energy White Paper* which will follow shortly – are aimed at providing investors with clarity over the government's plans, so they can look to the UK with confidence and help deliver the upgrades and projects needed across the country; and
- **Accelerate and improve delivery:** the government wants to transform the way infrastructure projects are delivered in the UK. This will be achieved through wide-ranging reforms from speeding up the planning system, to improving the way projects are chosen, procured and delivered, and greater use of cutting-edge construction technology.

This approach is underpinned by high levels of government investment, with record levels of investment for the railways, strategic roads, broadband networks and flood defences.

**This Strategy also puts innovation and new technology at the heart of the government's approach.** Every infrastructure sector could face transformative technological change over the next twenty years. From electric vehicles, to hydrogen heating systems, to 5G and its successors, new technologies have enormous potential to improve the environment and the daily lives of people across the UK. This Strategy will ensure the UK is at the forefront of this technological revolution.

**The whole of the UK will benefit from this Strategy.** Where policy is reserved for the UK government, this Strategy includes measures which will benefit every nation, such as a radical improvement in mobile coverage in rural areas. Where policy sits with the devolved administrations, Scotland, Wales and Northern Ireland will receive commensurate funding through the Barnett formula.

# Driving recovery and rebuilding the economy

The COVID-19 pandemic has caused hardship for individuals, families and businesses across the UK. The health emergency has been accompanied by an economic shock of historic proportions. The government has responded with an unprecedented economic support package, and will do whatever it takes to ensure the economic recovery from COVID-19 is as swift and strong as possible.

Infrastructure investment will have a key role to play in the recovery, both by maintaining jobs in the short term, and creating the conditions for long-term sustainable growth. In the summer, the government brought forward £8.6 billion of capital investment in infrastructure, decarbonisation and maintenance projects, supporting thousands of jobs.

Now the government is going further. To support the recovery, government investment in economic infrastructure will be £27 billion in 2021-22. The government is also setting out longer-term settlements for key infrastructure programmes, with record levels of investment in strategic roads, rail, broadband and flood defences. Economic infrastructure is one part of overall public investment, which also includes other areas such as schools, hospitals, and defence. Spending Review 2020 delivers £100 billion total investment in 2021-22 to support the recovery.

This decision to press on with high levels of investment, despite the fiscal pressures COVID-19 presents, marks the government's commitment to end the stop-start pattern of investment that has been common in the UK in the past. Next year the government will review the fiscal remit for the National Infrastructure Commission, to ensure it reflects the government's long-term ambitions.

Public investment is only part of the story. Private infrastructure investment will be crucial for the UK's economic recovery from the pandemic. This Strategy sets out how the government will support private sector investment, including through a new infrastructure bank for the UK which will co-invest with the private sector, and through the Prime Minister's Ten Point Plan for a Green Industrial Revolution, which will mobilise tens of billions of pounds of private investment.

Finally, the pandemic has had a profound impact on the way people use infrastructure. Many of these changes will be temporary: aided by government, city centres will bounce back; aviation will return. But in some areas changes could endure: more home working is likely in future, and the surge in cycling seen in the past six months could continue. The government will work closely with the NIC and industry to understand the longer-term effects COVID-19 may have on UK infrastructure, and the implications for policy.



# Levelling up and strengthening the Union

The government wants to use infrastructure to unite and level up the UK, delivering a stronger Union, thriving regions, cities living up to their full potential and revitalised towns and communities. To deliver this, the government is investing across the country, prioritising those areas that have received less support in the past.

## Leaving no community or business behind

- £5 billion to support UK-wide gigabit broadband roll-out, a Shared Rural Network extending 4G mobile coverage to 95% of the UK, and £250 million to ensure resilient and secure digital networks;
- £5 billion over this parliament for buses and cycling; and
- A new £4 billion cross-departmental Levelling Up Fund that will invest in local infrastructure in England (which will attract funding for Scotland, Wales and Northern Ireland in the usual way).

## Creating regional powerhouses, making cities the engines of growth and revitalising towns

- Supporting the largest city regions outside of London with £4.2 billion intra-city transport settlements;
- Backing new green growth clusters in traditional industrial areas, with carbon capture and storage, offshore wind, port infrastructure and low carbon hydrogen;
- Bringing jobs, investment and prosperity to some of the most deprived communities across the UK through the freeports programme;
- Revitalising over 100 town centres and high streets through the Towns Fund; and
- Restoring many of the rail services lost through the Beeching cuts of the 1960s.

## Connecting the regions and nations of the UK, and creating a united and global Britain

- Backing HS2 to deliver essential North-South connectivity, with an Integrated Rail Plan to deliver transformational improvements in the Midlands and the North;
- Record investment in strategic roads (over £27 billion), including the A66 between Penrith and Scotch Corner, Lower Thames Crossing, and the A303 Stonehenge; and
- Delivering a Union Connectivity Review reviewing options to improve transport links across the four nations of the UK.

## And changing how decisions are taken:

- Increasing the UK government's ability to invest directly in Scotland, Wales and Northern Ireland through the UK Internal Market Bill;
- Changing the way projects are appraised to support levelling up through the Green Book Review;
- Expanding devolution within England, and implementing the devolution deal in West Yorkshire;
- Relocating 22,000 civil servants out of London and the South East by 2030.

# Decarbonising the economy and adapting to climate change

As set out in the Prime Minister's Ten Point Plan for a Green Industrial Revolution, infrastructure investment is fundamental to delivering net zero emissions by 2050. The government will unlock private sector investment to accelerate the deployment of existing technology, such as retrofitting the UK's building stock and electrification of vehicles, while advancing newer technologies such as carbon capture and low-carbon hydrogen. The government's approach will create jobs to support the recovery from COVID-19, and support the government's levelling up agenda by ensuring key industrial areas are at the heart of the transition to net zero. The UK is already decarbonising faster than any other G20 country. As hosts of the UN Climate Change Conference COP 26 next year, the UK will go even further to promote the importance of low-carbon infrastructure and support its commitment to the Paris Agreement. Key measures include:

- Significant investment in offshore wind and into modern ports and manufacturing infrastructure to expand the share of energy generation from renewables;
- Providing up to £525 million to bring forward large-scale nuclear and invest in the development of advanced nuclear technologies;
- £1 billion to support the establishment of carbon capture and storage in four industrial clusters;
- Investing in hydrogen to scale up the UK's capacity to produce both 'blue' and 'green' hydrogen;
- Investing £1.3 billion in charging infrastructure to accelerate the mass adoption of electric vehicles ahead of ending the sale of new petrol and diesel cars by 2030;
- Enabling heat decarbonisation by supporting the roll-out of existing technologies like heat pumps and development of emerging technologies like hydrogen;
- Funding to help England to meet its share of the Climate Change Committee's recommendations to plant 30,000 hectares of trees a year in the UK; and
- Investing £5.2 billion by 2027 to better protect 336,000 properties and boost resilience of communities to the increased risk of flooding and coastal erosion resulting from climate change.

# Supporting private investment in infrastructure

Private investment has delivered major benefits for UK infrastructure and will be critical over the coming decades as the UK moves towards meeting net zero in 2050. The government is committed to supporting private investment and is taking action across the following areas:

- The government is setting up a new UK infrastructure bank, to co-invest alongside the private sector in infrastructure projects;
- The bank will operate UK-wide, be based in the North of England, and support the government's ambitions on levelling up and net zero;
- The bank will also be able to lend to local and mayoral authorities for key infrastructure projects, and provide them with advice on developing and financing infrastructure;
- The government is committed to the model of independent economic regulation, but will refine it to ensure it provides a clear and enduring framework for investors and businesses and delivers the major investment needed in decades to come, while continuing to deliver fair outcomes for consumers;
- The government will produce an overarching policy paper on economic regulation in 2021, which will consider regulator duties, how to inject more competition into strategic investments and the benefits of a cross-sectoral Strategic Policy Statement; and
- The government will continue to develop new revenue support models and consider how existing models – such as the Regulated Asset Base model and Contracts for Difference – can be applied in new areas, and remains open to new ideas from the market. The government will not reintroduce the private finance initiative model (PFI/PF2).

# Accelerating and improving delivery

The government wants to deliver infrastructure projects better, greener and faster. That means addressing longstanding challenges such as complex planning processes, slow decision-making, and low productivity in the construction sector. It also means learning lessons from the COVID-19 pandemic, for instance from the approaches that built Nightingale Hospitals in record time, and saw the UK move swiftly to secure access to a range of promising vaccines. Further, there is a clear opportunity with EU exit to change how this government delivers projects, using the flexibility the UK has as a sovereign country to do things differently.

The government set up Project Speed in the summer, to review every part of the infrastructure project lifecycle and identify where improvements could be made. Project Speed has developed a comprehensive package of reforms, including:

- Reform of environmental regulations to deliver a quicker and simpler framework for assessing environmental impacts and secure better outcomes for the environment;
- Landmark reform of the planning system including consulting on amending permitted development rights, to let schools and hospitals be expanded quickly;
- Transforming the construction sector to enable it to become more productive, more sustainable and more internationally competitive, with better use of data and modern methods of construction;
- Ensuring more effective decision making with streamlined approval processes, more emphasis on quality design, and better monitoring and evaluation;
- Embedding good design in all infrastructure projects through planning reforms; and
- Bringing about a step change in capability and leadership, accelerating investment in major project expertise and delivery skills and improving the skills base across the country to ensure every area can deliver the infrastructure it needs.

These reforms have already driven substantial progress, and in future mean the UK's vital infrastructure like schools, hospitals, transport and other networks will be delivered better, greener and faster:

- Better, because the process of assessing infrastructure projects under the revised methodology will ensure the government is valuing the wider economic, social and environmental benefits of a project. The government will set projects up to succeed by strengthening the assurance and decision-making regime.
- Greener, because the requirements of the net zero commitment will be considered in every stage of the project lifecycle and underpin decisions on the technical solutions chosen to achieve the required outcomes.
- Faster, by simplifying and shortening the processes through which projects secure the consents they need to proceed, procure contracts and deliver; while using modern methods of construction, new skills and a strategic relationship with industry which will improve productivity.



# Conclusion and next steps

This Strategy clearly sets out the government's long-term infrastructure ambitions:

- **It provides a long-term perspective** without ignoring shorter-term imperatives;
- **It sets out clear goals and plans to achieve them,** with more detail to come in some areas over the coming weeks and months;
- **It announces multi-year funding commitments** for many key infrastructure programmes; and
- **It confirms the government's commitment to fundamentally change** the way it considers and delivers infrastructure across the whole of the UK.

However, this isn't the final word on the government's infrastructure plans – it instead represents the first step of a multi-year process to transform the UK's infrastructure networks. This Strategy will also be followed by a series of detailed publications setting out further details on key areas of infrastructure policy, including the Construction Playbook, Energy White Paper, English Devolution and Local Recovery White Paper, a refreshed Industrial Strategy, Union Connectivity Review and an updated National Infrastructure and Construction Pipeline.

The government is also setting out new priorities for the National Infrastructure Commission, including commissioning a new study on greenhouse gas removal technologies, and preparing to appoint additional Commissioners.

# Introduction

This National Infrastructure Strategy comes at an historic time. COVID-19 has caused a significant health and economic shock. The UK has left the European Union and is fully independent and self-governing for the first time in 45 years, creating new opportunities to do things differently. **This is the moment to build back better, to create world-class infrastructure across the whole UK, and to transform people's lives for decades to come.**

**Infrastructure is the backbone of the economy** – vital to jobs, economic growth and quality of life for people across the UK. It affects everybody's daily lives in profound ways. The government's commitment to unite and level up the UK is more urgent than ever, and infrastructure will be crucial in renewing the fabric of the country.

The UK has a proud history of building infrastructure – from the railways that brought forth the industrial revolution to the Thames Barrier that protects millions from flooding each year. **But there are long-standing challenges that have held back the UK's infrastructure:** insufficient and costly 'stop-start' public investment; a lack of focus on the potential of great urban centres; slow adoption of new technology; policy uncertainty undermining private investment; and sluggish delivery, with projects too often delayed.

**This National Infrastructure Strategy tackles these challenges.** Rooted in the authoritative and impartial advice of the National Infrastructure Commission (NIC), it sets out how infrastructure can support the immediate economic recovery and the government's ambition to transform the UK's infrastructure networks over the next decade and beyond.

This Strategy marks the first decisive step change in the nation's infrastructure ambitions. The government's vision is for:

- **A united UK with thriving communities, cities, regions and nations**, with quality infrastructure giving everyone, everywhere opportunities to succeed. Communities will be brought together, broadband connectivity will be better, commutes will be shorter and delays will be fewer;
- **Greener and more beautiful places,** with cleaner air, more green spaces, green buses, more cycling, low-carbon and energy efficient homes, and better high streets for UK towns;
- **The UK to be a world leader in new technologies,** including wind power, hydrogen production carbon capture and storage, nuclear power, electric vehicles and zero emission planes; and
- **A stable and robust regulatory and delivery system,** leading to sustained public and private investment to support innovation, delivering projects better, faster and greener.



## Addressing long-standing challenges

The COVID-19 pandemic has introduced enormous short-term disruption, and may have long-term effects on the way people live, for instance with less daily commuting. However, this does not undermine the long-term arguments for infrastructure: the UK still needs to invest in digital, transport and utilities networks to underpin economic recovery and growth. It does mean that the government will have to continue to refine its approach to infrastructure investment in response to the impacts of COVID-19 in the years to come.

**Chapter 1 of this Strategy focuses on how infrastructure can boost short term economic growth and drive the recovery** from COVID-19. It sets out how *Spending Review 2020* delivers high levels of investment to support the economic recovery, with long-term settlements for key infrastructure programmes.

**Chapter 2 focuses on levelling up the economy.** The UK's major cities and regions are not as productive as international comparators. Towns and regions are held back by inadequate and out of date infrastructure, making it hard for people to get to work, run businesses and attract international investment. The UK's transport networks are ageing and congested and UK gigabit broadband coverage lags behind many competitor countries. There are also problems with poor infrastructure connecting the four nations of the UK. **This strategy announces an ambitious package of plans to level up the nations, regions, cities and towns of the UK and strengthen the Union** – with vastly improved broadband, road and rail networks connecting up the country, investments to boost cities, towns and communities, and getting the basics right everywhere with better roads, buses and cycling infrastructure. This is underpinned by changes in how and where decisions are made, to better reflect local and national needs.

The UK has made substantial progress in reducing carbon emissions from its power networks and the cost of renewables has fallen sharply – **but bold action is now needed to transform the UK's infrastructure to meet net zero and climate change commitments** as one of the world's leading, modern, sustainable economies.

In line with the Prime Minister's *Ten Point Plan for a Green Industrial Revolution*, **Chapter 3 sets out the government's plans to decarbonise power, heat, heavy industry and transport networks** - which together account for over 80% of UK emissions - and how to adapt to the risks posed by climate change.[1]

The UK has a proud record of attracting private investment into its infrastructure, and this will be even more vital in delivering on its net zero targets. But the government recognises that investors have faced some uncertainty in the past few years. **Chapter 4 of this Strategy sets out the government's plans to support private investment in infrastructure**, including by establishing **a new UK infrastructure bank**, to harness private capital investment.

**Finally, infrastructure delivery in the UK has been too slow for too long.** The COVID-19 pandemic has shown that this doesn't have to be the case; for instance the Nightingale hospitals were assembled in record timescales. **Chapter 5 sets out the steps the government is taking to accelerate and improve infrastructure delivery.** This will be achieved through wide-ranging reforms coming out of the Project Speed taskforce, from speeding up the planning system, to improving the way projects are chosen and run, reforming the way the government procures, and using cutting edge construction technology.

**The whole of the UK will benefit from this Strategy.** Where policy is reserved for the UK government, this Strategy includes measures which will benefit every nation of the UK, such as a radical improvement in mobile coverage in rural areas. Where policy sits with the devolved administrations, those governments will receive funding through the Barnett formula for the benefit of Scotland, Wales and Northern Ireland.

**The journey doesn't stop here.** Successful delivery of this plan will require collaboration across all parts of government, industry and civil society. The government will be following up this Strategy with further detail on a number of areas – including the English Devolution and Local Recovery White Paper and the Energy White Paper. The final chapter of this strategy sets out what the government will do next to deliver on its ambitions.

# The case for infrastructure investment

High quality infrastructure is crucial for economic growth, boosting productivity and competitiveness. It helps connect people to each other, people to businesses, and businesses to markets, forming a foundation for economic activity. Infrastructure acts as a direct 'input' for businesses, which rely on energy, transport and waste collection to operate. Well-developed transport and digital networks allow businesses to grow and expand, enabling them to extend supply chains, deepen labour and product markets, collaborate, innovate and attract inward investment. These 'agglomeration' effects are particularly powerful in city regions, where high quality infrastructure can play a substantial role in boosting productivity. But they also apply more broadly.

Infrastructure can also support other government policy objectives. For instance, it can improve skills and education through investment in digital technology and buildings. It is a key factor in determining where firms choose to locate and grow, and people's ability to access resources.

However, the size of the UK's capital stock (a measurement of the value of the UK's current infrastructure networks) is generally considered to be smaller than comparable economies.[2]

In 2019 the World Economic Forum (WEF) ranked UK infrastructure 11th in the world, behind comparable European economies such as France, Germany and the Netherlands.[3] The UK also falls well behind other countries on a sector-by-sector basis. For instance, WEF rank the UK 36th for the quality of its road infrastructure, and 79th on fibre internet subscriptions.

Businesses and communities also need consistency and certainty about planned infrastructure. For a long time, investment in UK infrastructure has been volatile and stop start. Previous governments have increased investment and then cut back. This has created a fractured supply chain, exposed to significant vulnerability, and is part of the reason why the UK has a lower infrastructure stock than in many other countries.

This means that increasing both public and private investment, whether in order to reduce some of the highest levels of road congestion in Europe,[4] or increasing gigabit-capable broadband access to continue to catch up to international competitors,[5] would have a relatively larger impact on growth and living standards in the UK.[6]



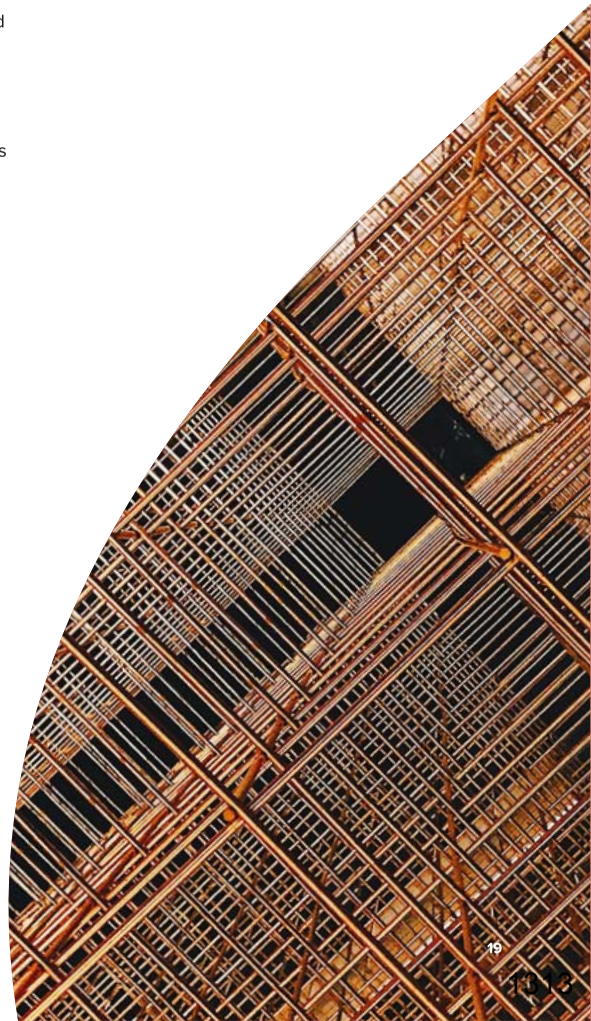
# The National Infrastructure Commission

The government set up the NIC in 2015, with the aim of providing impartial, expert advice on major long-term infrastructure priorities. The NIC published its first *National Infrastructure Assessment* in July 2018.[7] This comprehensive report set out the Commission's assessment of the UK's infrastructure needs over the next 30 years, and made a series of recommendations to the government across all areas of economic infrastructure: energy, transport, water and wastewater (drainage and sewerage), waste, flood risk management and digital communications.

**The NIC recommendations have already substantially influenced the government's infrastructure agenda** and provided the foundations for many of the measures announced in this Strategy and at previous fiscal events. This Strategy provides the government's formal response to the NIC's recommendations. But it also goes further, setting out the next steps in the government's plans for a step change in UK infrastructure policy. A detailed response to each NIC recommendation is provided alongside this Strategy in *Response to the National Infrastructure Assessment.*

This is the first time the government has responded to such a comprehensive assessment of the UK's infrastructure needs: the government intends to undertake a similar exercise and update this Strategy every five years, in response to future National Infrastructure Assessments.

**In line with the NIC's remit, this Strategy focuses on economic or networked infrastructure:** energy, transport, water, waste, flood risk management and digital communications. However, the reforms to project delivery will clearly benefit all forms of capital projects, including social infrastructure such as schools, hospitals and prisons. Further detail on the government's plans for social infrastructure investment are set out in *Spending Review 2020*.



# Recovery and rebuilding the economy

## At a glance

The COVID-19 pandemic has caused hardship for individuals, families and businesses across the UK. The health emergency has been accompanied by an economic shock of historic proportions. The government has responded with an unprecedented economic support package, and will do whatever it takes to ensure the economic recovery from COVID-19 is as swift and strong as possible.

Infrastructure investment will have a key role to play in the recovery, both by maintaining jobs in the short term, and creating the conditions for long-term sustainable growth. In the summer, the government brought forward £8.6 billion of capital investment in infrastructure, decarbonisation and maintenance projects, supporting thousands of jobs.

Now the government is going further. To support the recovery, government investment in economic infrastructure will be £27 billion in 2021-22. The government is also setting out longer-term settlements for key infrastructure programmes, with record levels of investment in strategic roads, rail, broadband and flood defences. Economic infrastructure is one part of overall public investment, which also includes other areas such as schools, hospitals, and defence. Spending Review 2020 delivers £100 billion total investment in 2021-22 to support the recovery.

This decision to press on with high levels of investment, despite the fiscal pressures COVID-19 presents, marks the government's commitment to end the stop-start pattern of investment that has been common in the UK in the past. Next year the government will review the fiscal remit for the National Infrastructure Commission, to ensure it reflects the government's long-term ambitions.

Public investment is only part of the story. Private infrastructure investment will be crucial for the UK's economic recovery from the pandemic. This Strategy sets out how the government will support private sector investment, including through a new infrastructure bank for the UK, which will co-invest with the private sector, and through the Prime Minister's Ten Point Plan for a Green Industrial Revolution, which will mobilise tens of billions of pounds of private investment.

Finally, the pandemic has had a profound impact on the way people use infrastructure. Many of these changes will be temporary: aided by government, city centres will bounce back; aviation will return. But in some areas changes could endure: more home working is likely in future, and the surge in cycling seen in the past six months could continue. The government will work closely with the NIC and industry to understand the longer-term effects COVID-19 may have on UK infrastructure, and the implications for policy.



The UK is experiencing a health and economic shock of historic proportions. The threat posed by COVID-19 has forced governments around the world to restrict activity to control the virus. The government fully recognises what a challenging period this is for the British people and for businesses across the economy, and will do whatever it takes to ensure the UK recovers as quickly and strongly as possible.

The government has responded with an unprecedented set of economic support measures, including the Coronavirus Job Retention Scheme (CJRS) which has supported millions of jobs across the economy, and further tax cuts and deferrals, grants and loans for businesses.

**The pandemic has also profoundly affected the way people use infrastructure** – planes have been grounded, trains left empty. Digital infrastructure has been crucial in keeping people connected. The number of people cycling has surged. There has been additional pressure on parts of the road network.

Within infrastructure, the transport sector has been the most heavily impacted, with dramatic falls in demand across many modes. Over the period, the government has responded with a series of targeted aid packages:

- The government is supporting the aerospace sector and its aviation customers with over £9 billion support through the Bank of England's COVID-19 Corporate Financing Facility, grants for research and development, loan guarantees and support for aerospace exports. In addition, the government has provided £5.7 million funding to air passenger services between Great Britain and Northern Ireland to ensure those who needed to travel could continue to do so;
- The government is safeguarding vital transport links to the mainland for people living on the Isle of Wight and the Isles of Scilly, including an emergency package of up to £10.5 million for lifeline ferry services;
- The government has provided more than £3 billion to support local light rail and bus networks, across the country to keep cities moving, including London, and maintain connectivity; and
- The government has stepped in to keep train services running in spite of severely reduced passenger demand. While these temporary arrangements are in place, the government will make an early start on key reforms and ensure a new and better type of rail network emerges following the pandemic.

The breakthroughs that have been achieved in vaccine development shows that an end to the pandemic is in sight. But some of the behavioural changes seen through this period are likely to endure. For instance, people are likely to spend more time working from home in future, making the government's plans to deliver gigabit broadband across the country even more important. Many people who have started cycling to work will continue to do so.

But in other areas, the economy may return to similar patterns to before the pandemic. For instance, cities will still be key engines of growth, with people and businesses clustering to drive and benefit from innovation. The government's plans for greater funding for city-regions will be key.

All of this creates questions for the government, such as how to address increased demand for space on the roads? And how to rebuild confidence in public transport as the pandemic eases? The government will work closely with industry, consumers and the NIC to address these questions.

It is also clear that COVID-19 has had a particularly harsh impact on the North of England, making the government's levelling up agenda even more pressing than before.

**The government's immediate focus now is on ensuring infrastructure investment and policy support the recovery.** Infrastructure investment can boost jobs, while also increasing growth and productivity. That is the government's aim through *Spending Review 2020*.

# Infrastructure and public health

As well as being vital for the economy and productivity growth, infrastructure is also a key driver of public health outcomes.

The pandemic has proven that taking steps now to increase overall public health – by improving air quality and encouraging cycling and walking to fight obesity – will pay dividends over the longer-term as the UK focuses on economic and physical recovery. The government is reflecting this priority in its approach to infrastructure investment.

The COVID-19 pandemic has shown that many people need to think harder about their health, and the lifestyle changes which might help them be more active and stay fit. Investment in active travel is critical to this. Government support for cycling and walking helps tackle obesity by providing ways for people to exercise as well as get from A to B, while measures to decarbonise the economy and reduce congestion will help improve air quality – and therefore health – across the UK.

This year has also highlighted the benefits of having truly local green space for mental and physical health and wellbeing, as well as highlighting the deficit in accessible green space for some communities and in deprived areas. The government is developing a National Framework of Green Infrastructure Standards for England that will show what good green infrastructure looks like, and help local authorities, developers and communities to improve provision in their area.



# Infrastructure and the recovery: the 2020 Spending Review

**The government is committed to major investment,** not just in the infrastructure sectors covered in this document, but also in other sectors including health, education, science and defence. **Spending Review 2020 delivers £100 billion total investment in 2021-22 to support the recovery.** This is part of the government's plans to invest over £600 billion over the next five years, delivering the highest sustained levels of public sector net investment as a proportion of GDP since the late 1970s.

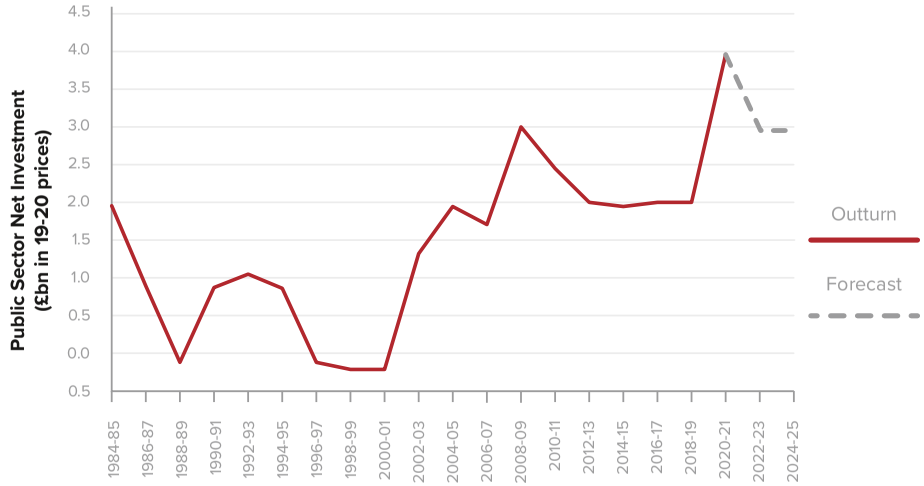
The economic infrastructure sectors covered in this document, such as transport, energy and digital communications form a key part of these plans. **Next year the government will spend £27 billion in these sectors.**[8]

As well as setting budgets for next year, the Spending Review announces longer-term budgets for key capital programmes and projects. This includes funding for HS2 – the biggest infrastructure project in Europe – and record levels of investment in programmes for strategic roads, flood defences and broadband. Further details are set out in *Spending Review 2020*.

**Taken together, these spending commitments mark a clear step change in the UK's approach to infrastructure investment.** Too often in the past, governments have invested too little in infrastructure, or investment has been done on a stop-start basis. This government is committed to end that, recognising that climate change, regional inequality and low productivity are long-term challenges that require a sustained commitment.

Public investment is only part of the story. Much of the UK's infrastructure is financed by the private sector, and **private investment will be crucial for the UK's economic recovery from the pandemic.** This Strategy sets out how the government will support private sector investment. This includes the introduction of a major new national infrastructure bank to catalyse investment in infrastructure projects. And this Strategy delivers on the Prime Minister's *Ten Point Plan for a Green Industrial Revolution*, which is intended to mobilise tens of billions of pounds of private investment.

Public sector net investment since 1984-85 to 2025-26




Source: OBR. Sharp increase in 2020-21 is driven by the upfront cost of expected future calls on government guaranteed loans and a fall in GDP

# The National Infrastructure Commission's fiscal remit

The National Infrastructure Commission's (NIC's) Charter commits the government to setting a binding fiscal remit to ensure that the NIC's recommendations remain affordable. While the need for infrastructure investment is clear, the government remains committed to fiscal sustainability, and is mindful of the significant fiscal pressures that exist over the short- and medium-term. The fiscal remit aims to strike an appropriate balance.

The fiscal remit refers to investment in those sectors covered by the NIC: transport, energy, flood risk management, digital communications, water, and waste. The fiscal remit is designed to ensure that the NIC clearly prioritise their recommendations and explain which they consider are most critical in addressing the country's long-term infrastructure needs.

In 2016 the government set the NIC's fiscal remit at between 1-1.2% of GDP. This means that the NIC must be able to demonstrate that its recommendations are consistent with gross public investment in economic infrastructure of between 1% and 1.2% of GDP in each year between 2020 and 2050. This remit applies to both the National Infrastructure Assessment and specific studies.

The government is committed to increasing infrastructure investment to drive the economic recovery and make progress against its longer-term plans, and it is important that the NIC's fiscal remit reflects these ambitions. However, given current economic uncertainty, now is not the right time to definitively update the remit. Instead, the government will review the NIC's fiscal remit in detail next year, to ensure it continues to reflect the government's ambitions as the NIC prepare to publish their second National Infrastructure Assessment. In the meantime, the government will maintain the NIC's fiscal remit at a minimum of 1-1.2% of GDP.

# Delivering on these commitments

The construction industry is essential to maintaining and delivering vital infrastructure services, including transport and utilities networks, and ensuring public safety by delivering critical public health facilities and remediating unsafe buildings. But the sector also faces long-term challenges. It is fragmented when compared to those in other countries; struggles to raise investment for innovation; and in the UK has had to manage significant cycles of public investment increases and cuts.

The construction sector has responded well to the pandemic, working closely with government and key stakeholders to ensure sites can remain open and activity can continue safely. But the government recognises the challenges the sector is still facing now, with uncertainty weighing on private investment. While the majority of construction sites have now reopened, the sector still faces significant challenges as a result of reduced private sector demand and the knock-on impact this has for job retention and financial health.

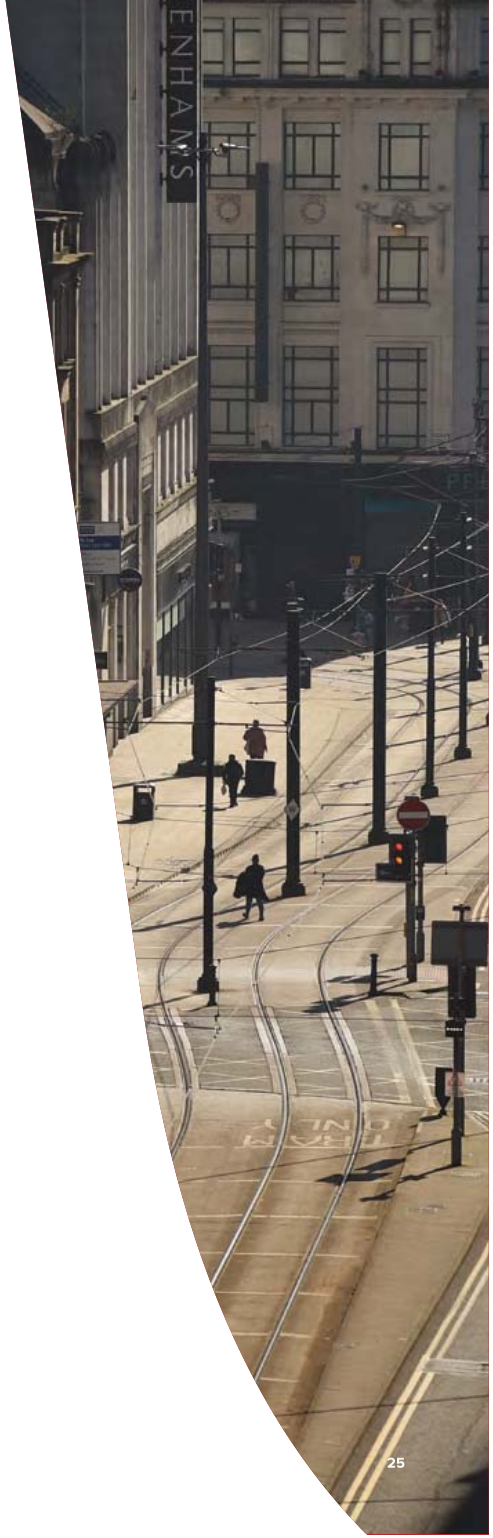
Continuing to progress the UK's ambitious infrastructure plans in all parts of the country is vital to the recovery of the construction sector, and the economy as a whole. The government is continuing to do everything it can to ensure that construction sites are able to remain open and operate safely, so that the industry emerges from the pandemic with the capability and capacity to deliver this Strategy.

By ramping up investment progressively in a structured way, the government's ambition is to eliminate the peaks and troughs that have proved destabilising for the supply chain in the past. The government has taken a balanced approach between new and existing assets, as well as delivering more local and regional enhancements to create a varied pipeline in terms of the size and location of projects. This will result in commercial opportunities to small and medium-sized enterprises as well as large contractors.

Alongside ongoing major projects such as HS2, in the immediate-term new investment will be targeted at smaller local schemes to upgrade existing infrastructure. These projects can be taken through planning and development quickly to provide employment opportunities in the UK construction sector that would otherwise be affected by COVID-19 and decreasing private sector demand.

HM Treasury is strongly encouraging all government departments and their agencies to progress approved and funded projects into procurement and contract without delay (subject to good project discipline). This includes continuing to publish a comprehensive *National Infrastructure and Construction Pipeline*, with the next update in Spring 2021.

The government is also urging local authorities to take steps to preserve construction jobs in their areas by progressing funded projects as soon as practicable. Finally, the government will use its weight as a major construction client to transform and modernise the industry, through the publication and implementation of the *Construction Playbook*.



# Levelling up the whole of the UK

## At a glance

The government wants to use infrastructure to unite and level up the UK, unleashing the potential of the Union, thriving regions, cities living up to their full potential and revitalised towns and communities. To deliver this, the government is delivering major investment across the country, prioritising those areas that have received less support in the past.

### Leaving no community or business behind

- £5 billion to support UK-wide gigabit broadband roll-out, a Shared Rural Network extending 4G mobile coverage to 95% of the UK, and £250 million to ensure resilient and secure 5G networks;
- £5 billion over this parliament to transform bus services and cycling infrastructure;
- A new £4 billion cross-departmental Levelling Up Fund that will invest in local infrastructure in England (which will attract funding for Scotland, Wales and Northern Ireland in the usual way); and
- £5.2 billion by 2027 to better protect communities from flooding and coastal erosion.

### Creating regional powerhouses, making cities the engines of growth and revitalising towns

- Supporting the largest city regions outside of London with £4.2 billion intra-city transport settlements;
- Backing new green growth clusters in traditional industrial areas, with carbon capture and storage, offshore wind, port infrastructure and low carbon hydrogen;
- Bringing jobs, investment and prosperity to some of the most deprived communities across the four nations of the UK through the freeports programme;
- Revitalising over 100 town centres and high streets through the Towns Fund; and
- Restoring many of the rail services lost through the Beeching cuts of the 1960s.

### Connecting the regions and nations of the UK, and creating a united and global Britain

- Backing HS2 to deliver essential North-South connectivity, with the Integrated Rail Plan delivering transformational improvements in the Midlands and the North;
- Record investment in strategic roads (over £27 billion), including the A66 between Penrith and Scotch Corner, Lower Thames Crossing, and the A303 Stonehenge; and
- Delivering a Union Connectivity Review identifying options to improve transport links across the four nations of the UK.

### And changing how decisions are taken

- Increasing the UK government's ability to invest directly in Scotland, Wales and Northern Ireland through the UK Internal Market Bill;
- Changing the way projects are appraised to support levelling up through the Green Book Review;
- Expanding devolution within England, and implementing the devolution deal in West Yorkshire; and
- Relocating 22,000 civil servants out of London and the South East by 2030.

The government's vision is to level up the whole of the UK and deliver a stronger Union between Scotland, Wales, Northern Ireland and England. The growth of every region and nation in the UK is vital, not just to boost economic growth and productivity, but to create a stronger, fairer and more inclusive society.

Great nations, where opportunity and talent are spread evenly, depend on great infrastructure. Although not the only factor – skills, local leadership and business environment are also fundamental – infrastructure plays a crucial role in resolving disparities between places. Better infrastructure networks can have a transformative effect on economic and social outcomes as they connect people, either physically or digitally, to opportunities.

Some parts of the UK lead the world as great places to live, work and do business, in part due to excellent infrastructure. The government will draw on its experience in these places to **create a new infrastructure anatomy that unites and levels up the whole of the UK**.

First, **the government will ensure that no citizen, community or business is left behind**, by connecting them to the next stage of the digital revolution and ensuring that they can get around their local community with well-maintained local roads. The government is also improving the essential, everyday features of peoples' lives; faster and greener buses that markedly improve the commute, and high quality, well integrated cycling infrastructure that sparks a gear change in the way people ride.

Second, **re-balancing the UK relies on boosting the cities and towns** most in need. Cities are the anchors of successful regions across the world; they are engines of growth. To drive economic growth across all regions of the UK, the government is investing in growth in cities. But over half the UK's population live in towns, many of which have suffered economic and social decline over decades. The government is investing in infrastructure revitalise towns, as well as to drive their economic regeneration.

Third, the government will **connect the nations and regions of the UK**, building infrastructure networks that bring together the whole of the UK. To level up and unite the country, cities across the UK must also be accessible to each other, to support trade across regions and spread growth from south to north, east to west and back again. The government is investing in national transport and pivoting investment away from London, ensuring every region has great connectivity.

Fourth, **maintaining the UK's position as a global trading nation** also requires infrastructure that connects the country to its international partners - linking businesses to valuable markets and to support trade and investment. The government is supporting private sector investment to improve infrastructure for international freight and aviation.

Finally, **this will require doing things differently**, including changing how investment and policy decisions are made. This means ensuring that decisions are not just made in Whitehall but reflect the diversity of this country, empowering local areas and leaders, but also ensuring decisions can be made for the UK as a whole where appropriate. It is vital that decision-making frameworks such as the Green Book also reflect the government's levelling up agenda.

## Infrastructure across the Union

As responsibility for much infrastructure is devolved, the devolved administrations receive funding through the application of the Barnett formula in line with investment decisions taken by the UK government. This funding ensures the devolved administrations have the means to invest in infrastructure to support people and businesses in Scotland, Wales and Northern Ireland.

| Infrastructure sector | Devolved Administration responsibility | | |
|---|---|---|---|
| | Scotland | Wales | Northern Ireland |
| **Transport** | Largely devolved | Largely devolved, aside from rail and aviation | Devolved |
| **Energy** | Not devolved, aside from energy efficiency | Not devolved, aside from energy efficiency | Devolved, aside from nuclear |
| **Digital** | Not devolved | Not devolved | Not devolved |
| **Waste and sewage** | Devolved | Devolved | Devolved |
| **Flood risk** | Devolved | Devolved | Devolved |
| **Waste** | Devolved | Devolved | Devolved |

**Source: National Infrastructure Commission**



# Leaving no community or business behind

From Teeside to Tonbridge, from Bury to Bristol, from Lewis to Lewes, and from Portadown to Penzance, the government is determined to level up the opportunities available everywhere, boosting jobs, wages and prospects for all communities. The economic opportunities available to many people depend on where they were born, grew up and still live – around 40% of the UK population live within the local area where they were born.[9] These economic opportunities are therefore dictated in practice by the nature of their local economy.

**This is why the government is also taking action to deliver** local roads, buses, cycling, better digital connectivity and flood defences across the country. Where policy is devolved the devolved administrations will receive funding through the application of the Barnett formula in line with the decisions taken by the UK government. Where policy is reserved - for example digital infrastructure - the UK government is focused on improving connectivity for the whole of the UK.

**Rural communities in particular rely on strong infrastructure networks to support their local economies**, and these must be well-thought through and maintained. The government's long-term ambition is for people and businesses in rural areas to be able to easily access and unlock opportunity, as in other parts of the UK by improving connectivity.

## Investing in local priorities

The government is creating a new £4 billion Levelling Up Fund that will invest in local infrastructure that has a visible impact on people and their communities and will support economic recovery. Moving away from a fragmented landscape with multiple funding streams, this new cross-departmental fund for England will invest in a broad range of high value local projects up to £20 million, or more by exception, including bypasses and other local road schemes, bus lanes, railway station upgrades, regenerating eyesores, upgrading town centres and community infrastructure, and local arts and culture. It will be open to all areas in England and prioritise bids to drive growth and regeneration in places in need, those facing particular challenges, and in areas that have received less government investment in recent years. This fund will attract funding for Scotland, Wales and Northern Ireland in the usual way.

## Local roads

This Strategy, will transform the journeys people make every day. Local roads make up 98% of the network and are used in almost every journey. They are estimated to be worth £400 billion – one of the UK's most valuable public assets.[10] Well-maintained local roads allow for faster and more reliable journeys, boosting local businesses and serving all road users. High quality local roads are also central to the future of transport, playing an important role in the take-up of autonomous vehicles and greener forms of transport such as cycling and buses.

**The Spending Review commits £1.125 billion of local roads maintenance funding in 2021-22**, including £500 million for the Potholes Fund to fix potholes and resurface roads. **This will be supported by £260 million allocated to Local Authorities in 2021-22 for shovel-ready local transport schemes** through the Integrated Transport Block, including public transport and active travel upgrades.

**The government is also investing £310 million in 2021-22 in upgrading the road network**, reducing congestion and making it better able to cope with demand by adding capacity. This will support investment in over 50 schemes in this Parliament such as North Hykeham relief road and crossings in both Lake Lothing and Great Yarmouth due to start construction shortly. **Altogether, this means the government is investing £1.7 billion in local roads in 2021-22.**

## Buses and active travel

Road-building alone cannot solve congestion: the UK also needs to use limited road space more efficiently. **This forms part of the government's broader agenda for driving improvements in local transport across the country through £5 billion for buses and cycling over this Parliament**. Increasing cycling and walking can help tackle some of the most challenging issues facing UK society: improving air quality, combatting climate change, improving health and wellbeing, addressing inequalities and tackling congestion on the roads. There has already been progress in this space – despite fewer people travelling overall during the pandemic, in the summer there was around a 100% increase in weekday cycling, and on some weekends the increase has been around 200%, compared to early March, prior to the lockdown.[11]

**In May, the government announced a £2 billion active travel package in order to make it easier and safer for people to walk and cycle.** This investment will support the delivery of the priorities set out in Gear Change, the government's new long-term walking and cycling strategy,[12] which will ensure high design standards, and help integrate new cycling infrastructure into cities, alongside other road users, with thousands of miles of safe, continuous and direct cycling routes. **This funding included £225 million in emergency funding in 2020-21 for local authorities to help them create cycle lanes and more space for pedestrians.**

Buses are the workhorses of public transport, accounting for over 50% of journeys.[13] Yet domestic bus use has been in decline, falling by over 10% since 2009-10 outside London.[14] The government is investing to build back better by supporting local authorities and operators to work together to coordinate timetables and ticketing to meet shifting patterns of demand, deliver bus priority measures that tackle congestion, and employ open data and demand-responsive technologies to improve the customer experience. **The Spending Review commits £300 million in 2021-22 to drive transformation, maintain essential services as long as necessary, and support the industry through the COVID-19 recovery.** This combination of measures will make trips smoother and faster than ever before.

## Digital connectivity

The UK is a nation that thrives on digital connectivity, with some of the highest rates of digital adoption in the world. The UK has the fifth largest number of broadband and mobile subscriptions in the OECD,[15] and more people in the UK shop online than in any EU member state.[16] The government wants to deliver high quality, reliable digital infrastructure that works across the UK, so that mobile calls do not drop, video calls don't freeze, and people working from home can do their jobs and run their businesses with ease.

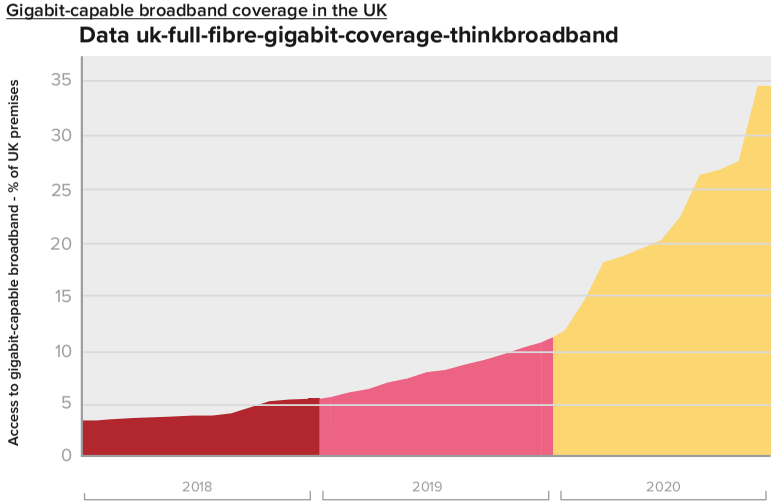
**Fast, reliable digital connectivity can deliver economic, social and well-being benefits for the whole of the UK.** Never has this been more important than as the country deals with the impact of COVID-19, when digital infrastructure has enabled home working, home learning, and kept families in touch with each other in extraordinary circumstances.

**Digital infrastructure is particularly important for the UK's rural communities in all four nations.** Greater connectivity can help rural businesses innovate, grow, and create jobs. In doing so, it can help rural areas attract and retain young people and families, supporting thriving rural societies.

Gigabit-capable broadband, such as full fibre, can provide speeds of over 1,000Mbps, over forty times faster than standard superfast broadband and fast enough to download an HD film in seconds. These speeds provide new opportunities across the UK, for consumers and businesses alike, and enable 5G technology.

**The government's programme for gigabit-capable broadband has made dramatic progress.** More than a third of UK premises now have access to gigabit-capable connections, up from 9% when the government took office in July 2019. By next year, more than half of all premises will have access. During the COVID-19 pandemic, operators have rightly focused on network resilience at a time of unprecedented need for good connectivity. The government has also announced restrictions on the use of Huawei equipment. The government is working with industry to target a minimum of 85% gigabit capable coverage by 2025, but will seek to accelerate roll-out further to get as close to 100% as possible. The government will continue to implement an ambitious programme of work to remove barriers to broadband deployment and maximise coverage in the hardest to reach areas of the country.

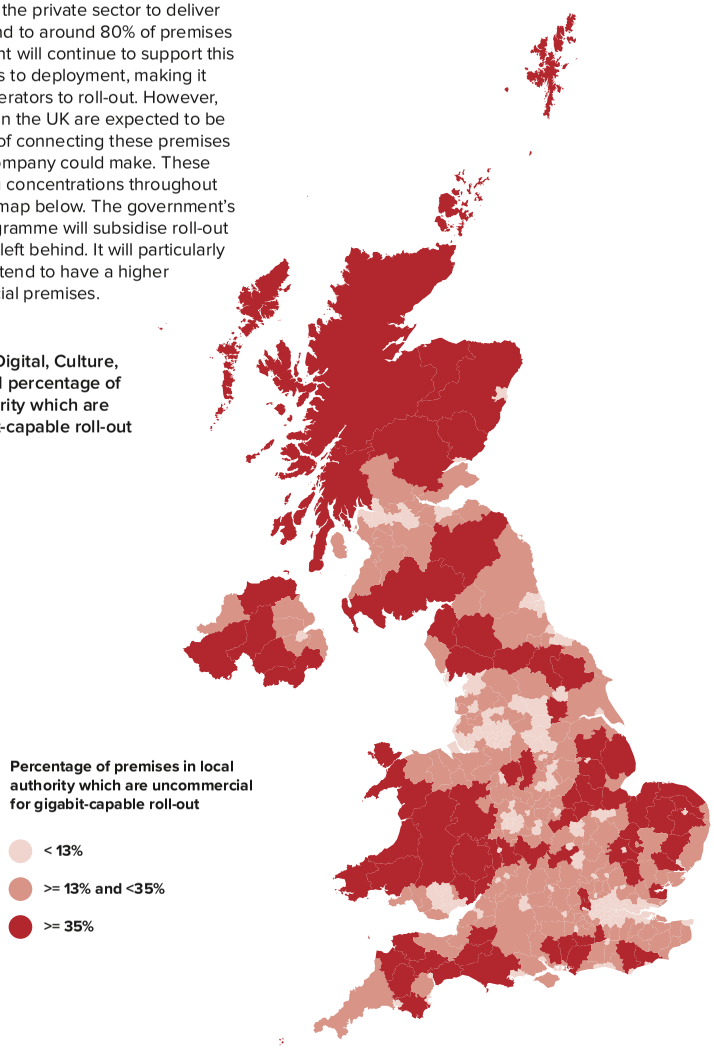
Gigabit-capable broadband coverage in the UK




Source: Graph compiled using UK gigabit coverage data from thinkbroadband. UK gigabit coverage defined as percentage of UK premises with access to FTTP and/or DOCSIS 3.1. Data as of 10 November 2020.

## The strategy for UK-wide gigabit-capable broadband

The government expects the private sector to deliver gigabit-capable broadband to around 80% of premises in the UK. The government will continue to support this through removing barriers to deployment, making it quicker and easier for operators to roll-out. However, around 20% of premises in the UK are expected to be uncommercial: the costs of connecting these premises outweigh the returns a company could make. These premises occur in varying concentrations throughout the UK, as shown by the map below. The government's £5 billion UK Gigabit Programme will subsidise roll-out to ensure no area will be left behind. It will particularly benefit rural areas which tend to have a higher proportion of uncommercial premises.




**Source: Department for Digital, Culture, Media & Sport. Estimated percentage of premises in a local authority which are uncommercial for gigabit-capable roll-out**

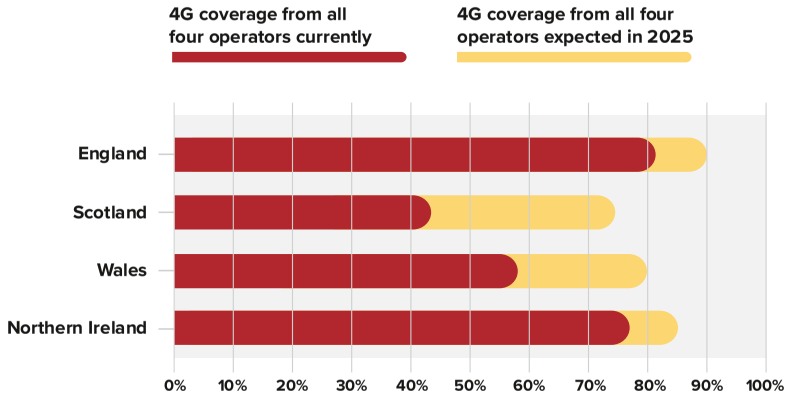
**UK-wide roll-out is a major civil engineering project, requiring enough cabling to go around the Earth more than ten times.**[17] The total level of investment required is in the region of £30 billion. Through the government's ambitious strategy, rapid increases in the rate of digital infrastructure deployment are already being seen and the UK is expected to see record speeds of deployment in the coming years. Current market data suggests that operators are on track to deliver new full fibre coverage to 2.5 million premises in 2020, up from around 750,000 in 2018.[18] The government expects this build rate to increase even further, creating thousands of new jobs.

Mobile connectivity is also crucial to allowing people to stay connected on the move. That is why **the government is investing £500 million, matched by industry, to deliver high-quality 4G mobile coverage from at least one operator across 95% of the UK by 2025,** through the Shared Rural Network. Through this ground-breaking partnership between government and industry, each operator has individually committed to reach 90% of the UK's landmass by 2026, and collectively the Shared Rural Network will provide additional coverage to 280,000 premises and 16,000 kilometres of roads by 2026. This will have major benefits in rural areas, and for Scotland, Wales and Northern Ireland nations in particular.

The Shared Rural Network will not only improve coverage, but also increase consumer choice. Currently, only 67% of the UK has good quality coverage from all four operators, and that will improve to 84% by the end of the programme.[19] This will mean far fewer people in rural areas will find themselves locked-in to the only mobile network with good coverage of their area.

**The government will continue its pioneering 5G Testbeds and Trials Programme, with £50 million in 2021-22** to support demonstration projects across rural, urban and industrial settings. These projects show the exciting potential for 5G to transform the lives of consumers and businesses, and are a key part of ensuring the benefits of 5G can be felt in every nation of the UK by the mid-2020s.

It is also vital that digital infrastructure networks are secure and resilient. That is why the government is introducing the Telecommunications (Security) Bill which sets out a new regulatory regime for telecoms security. **The government will also publish the 5G Supply Chain Diversification Strategy to ensure the UK's 5G networks are not over reliant on a single supplier, committing £250 million to start this journey.** The strategy will set out a clear and ambitious plan to grow the telecoms supply chain and ensure it is resilient to future trends, to shape global standards, and to make significant investments in research and development to bring through new technology. The government will seek the advice of the Telecoms Diversification Task Force in developing specific programmes under this strategy.




Source: Ofcom 2020 Summer Update Connected Nations

## Flooding

Expanding economic opportunity means little for a place – and the people who live and work there – if the infrastructure supporting it is not resilient to potential hazards. Many rural communities and economies across the UK have experienced the devastating impacts of flooding, which can cause significant damage to homes and businesses lasting much longer than the floods themselves. The government is committed to harnessing the opportunities of rural landscapes to increase the resilience of rural communities to flooding. **The government will do this by maximising good land management and implementing nature-based solutions through the next £5.2 billion flood and coastal defence programme starting in 2021**, a doubling of the current programme. Further details are set out in Chapter 3.

# Boosting the UK's cities and towns

The government recognises that different places across the UK have different challenges:

- **Regional cities** are not as productive or as connected, as they should be. The government's long-term ambition is for UK cities to be globally competitive. The government will support them to improve their productivity through strengthened infrastructure; and
- **Many towns have lost out from structural changes** – facing economic and social deprivation. The government's long-term ambition is for every town to be an excellent place to live and work – offering opportunity to those who live there. The government will drive the regeneration of towns, including through investing in infrastructure.

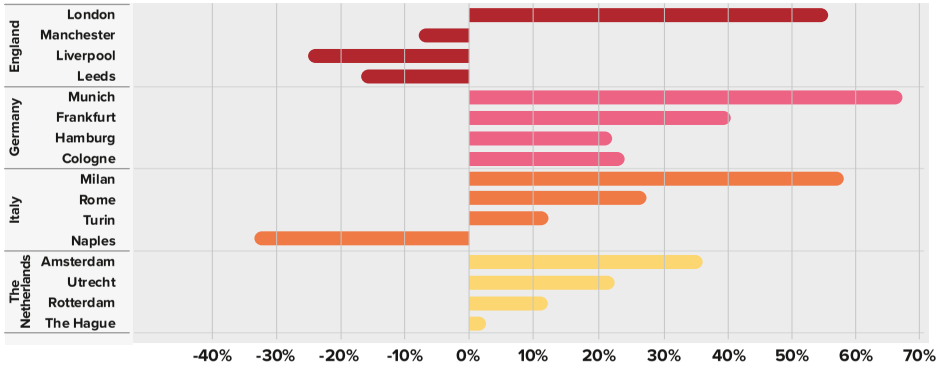
## Making cities the engines of future growth

The government shares the National Infrastructure Commission's (NIC's) view on the importance of strong regional cities; the vital organs of the UK economy. Cities drive economic growth through agglomeration effects; they encourage specialisation, drive competition and spread ideas and innovation faster than other places. London is one of the most productive cities in the world, and many other UK regional cities can also play a similarly important role in the UK economy.

However, the NIC noted that many of the UK's largest cities have below average productivity relative to their size and population, in part due to high congestion and poor local transport links. They are not producing agglomeration economies to the degree that they could. This in turn has an impact on the success of nearby towns, as strong cities can act as an anchor for growth across a wider region.

A well-designed public-transport network is fundamental to the operation of any city. London is the only city in Europe where you can access more local services by public transport than by car.[20] But the story is different in regional cities, where access to those same services by public transport lags behind continental peers. **This is why the government will invest in the North, Midlands and South West to help rebalance the UK economy, and devolved administrations will receive funding to enable public transport investment in Scotland, Wales and Northern Ireland.** Levelling up the rest of the UK does not mean levelling London down. The government is continuing to address capacity issues in the capital, by financing the completion of Crossrail, but has agreed that Transport for London will stop development on Crossrail 2. This frees up investment to raise the performance of public transport networks in the regional cities towards London's gold standard.

Productivity in selected major cities in England and comparable countries.
Calculated using GDP per capita in the metropolitan area as share of the national value




Source: National Infrastructure Commission calculations using OECD Statistics. Functional Urban Areas and National level, 2018 (except France where latest urban productivity data is 2016). Productivity in English cities has been calculated as a percentage of the UK average

The government agrees with the NIC that long-term and locally led investment in large cities' transport networks is critical to driving future economic growth and competitiveness. This is central to the government's ambition of levelling up the UK.

The Transforming Cities Fund was launched at Autumn Budget 2017 to improve public transport, boost connectivity and reduce congestion through packages of interlinked schemes such as light rail, new bus corridors, cycling and walking infrastructure. The government has now allocated nine city regions a share of over £1.2 billion for a range of shovel-ready public and sustainable transport schemes – in addition to the over £1 billion already devolved to six Mayoral Combined Authorities. In line with the NIC recommendation, this will drive up productivity and spread prosperity through investment in public transport in MCAs.

Alongside the Transforming Cities Fund and a share of the £5 billion announced for buses and cycling over this Parliament, **eight City regions will also benefit from £4.2 billion government investment in five-year funding settlements for local transport starting in 2022-23,** and £50 million in 21/22 to support preparations for settlements. Following the approach that has worked for London, these settlements will be agreed with elected Mayors and published, providing transparency and accountability while giving Mayors the flexibility and certainty to deliver their plans. The city regions that will receive settlements, subject to appropriate governance, include Greater Manchester, Liverpool City Region, West Midlands, West Yorkshire, Sheffield City Region, Tyne and Wear, West of England and Tees Valley. This will deliver the NIC's recommendation to provide settlements that enable long-term and locally-led investment in large cities transport networks, devolving decisions on local transport to those that understand those systems best.

Transport needs to work hand in glove with skills, education, housing, culture and environment policies to deliver the step change in quality of life and economic performance the government wants to see. Alongside transport, the government is therefore taking steps to improve local infrastructure more broadly, working in conjunction with local areas to ensure investment is in line with local priorities. The government has agreed City and Growth Deals across the UK, to provide local areas with the powers and funding they need to drive forward local economic priorities. The government is investing in Scotland, Wales and Northern Ireland's cities, towns and rural areas through City and Growth Deals. There are 20 City and Growth Deals in Scotland, Wales and Northern Ireland either agreed or in negotiation, committing almost £3 billion of UK Government investment. This means every part of Scotland, Wales and Northern Ireland is supported by a City and Growth deal.

The government also continues to support pan-regional partnerships; the Northern Powerhouse, Midlands Engine, Western Gateway - and recognises the role they play in championing investment and opportunity in their geographies.

Spending Review 2020 also confirms that, in addition to the Brownfield Housing Fund announced at March Budget 2020 for Mayoral Combined Authorities to unlock up to 26,000 high quality homes, **the government will provide an additional £100 million in 21/22 to support housing delivery and regeneration**, including unlocking brownfield sites, regenerating estates and releasing serviced plots on public sector land.

These plans form part of the £7.1 billion National Home Building Fund which will help deliver up to 860,000 homes across the country, in large part through investment in infrastructure to unlock housing – including roads, community facilities and utilities. This will ensure that more homes mean better, not more stretched, local infrastructure and community facilities.

## Regenerating towns and communities

Towns in the UK are hubs of economic activity and provide homes to the majority of the population in the UK. While some towns have prospered, either in their own right or through their links to growing cities, many struggling towns do not always have the fundamental building blocks for a strong local economy in place.

Some towns face specific disadvantages that reduce growth and productivity. This can be a mix of economic deprivation, characterised by high concentrations of low-skilled workers, social deprivation, poor employment and low health outcomes. This can be exacerbated by poor transport and digital connectivity. Places that face these challenges need targeted support to help boost their local economies, support local leadership and maximise their potential.

**The government will, therefore, invest in infrastructure to support economic regeneration and create new employment opportunities in the towns across the UK** which are most in need, to make them excellent places to live and work.

Through the Towns Fund, the government is galvanising the local economies of over 100 struggling towns across England to support their long-term economic and social regeneration as well as their immediate recovery from the impacts of COVID-19. The first seven Town Deals were agreed in October 2020. Further successful towns will be announced over the coming months.

The government is taking steps through national programmes to support local economies, in towns across the UK. **Through its ambitious Freeports programme the UK government will bring jobs, investment and prosperity to some of the most deprived communities across the four nations of the UK.** Freeports will enjoy a combination of tariff benefits, tax incentives, and regeneration funding. The programme aims to establish Freeports as national hubs for global trade and investment across the UK, promote regeneration and job creation, and create hotbeds for innovation. A minimum of 10 Freeports will be delivered. Successful bidders will be announced in Spring 2021 and the first Freeports will be designated in late 2021.

Supporting jobs and growth across the UK, in particular in post-industrial and coastal towns, the government's decarbonisation agenda will build the UK's capability in new green industries. Infrastructure investment in offshore wind capacity (40GW by 2030) and port infrastructure will create jobs in coastal communities. Further investment in in Carbon Capture and Storage and in low carbon hydrogen will drive economic activity in post-industrial towns.

# Infrastructure investment across the UK

Where policy is reserved for the UK government – for example digital infrastructure – it is taking action to improve infrastructure across the whole of the UK. Where policy is devolved – for example substantial areas of transport – the UK government allocates funding to the devolved administrations through the Barnett formula.

The map shows how investment by the UK government in a number of local infrastructure programmes will benefit different regions.

In addition, **the government is making key transport investments in England, including:**

## 1 North East

- **Tyne and Wear** and **Tees Valley** will benefit from intra-city transport settlements starting from 22/23.
- Providing £209m to the North East including £16m to redevelop **Sunderland** Central Station.

## 2 North West

- **Greater Manchester** and **Liverpool** City Region will benefit from intra-city transport settlements starting from 22/23.
- Providing £40m to **Preston** City Region including funding for a next generation Urban Traffic Management and Control system.
- Providing an additional £146m to halve the construction time of dualling the A66 across the Pennines.

## 3 Yorkshire and Humber

- **Sheffield** and **Leeds** City Regions will benefit from intra-city transport settlements starting from 22/23.
- Providing £319m to **West Yorkshire Combined Authority** including £30m for active and sustainable travel across **Bradford**, and £171m to **Sheffield** City Region including for a new bus rapid transit link.
- Developing schemes including the A1 from **Doncaster** to **Darrington**.

## 4 West Midlands

- **West Midlands** Combined Authority will benefit from intra-city transport settlements starting from 22/23.
- The Transforming Cities Fund provides £321m to **West Midlands** Combined Authority to invest in public transport schemes.
- Upgrading the A46 Coventry Junctions.

## 5 East Midlands

- Providing £169m to **Derby & Nottingham** including £25m for bus rapid transit in Derby, and £40m to **Leicester**.
- Progressing the North Hykeham Relief Road in **Lincolnshire.**

## 6 East of England

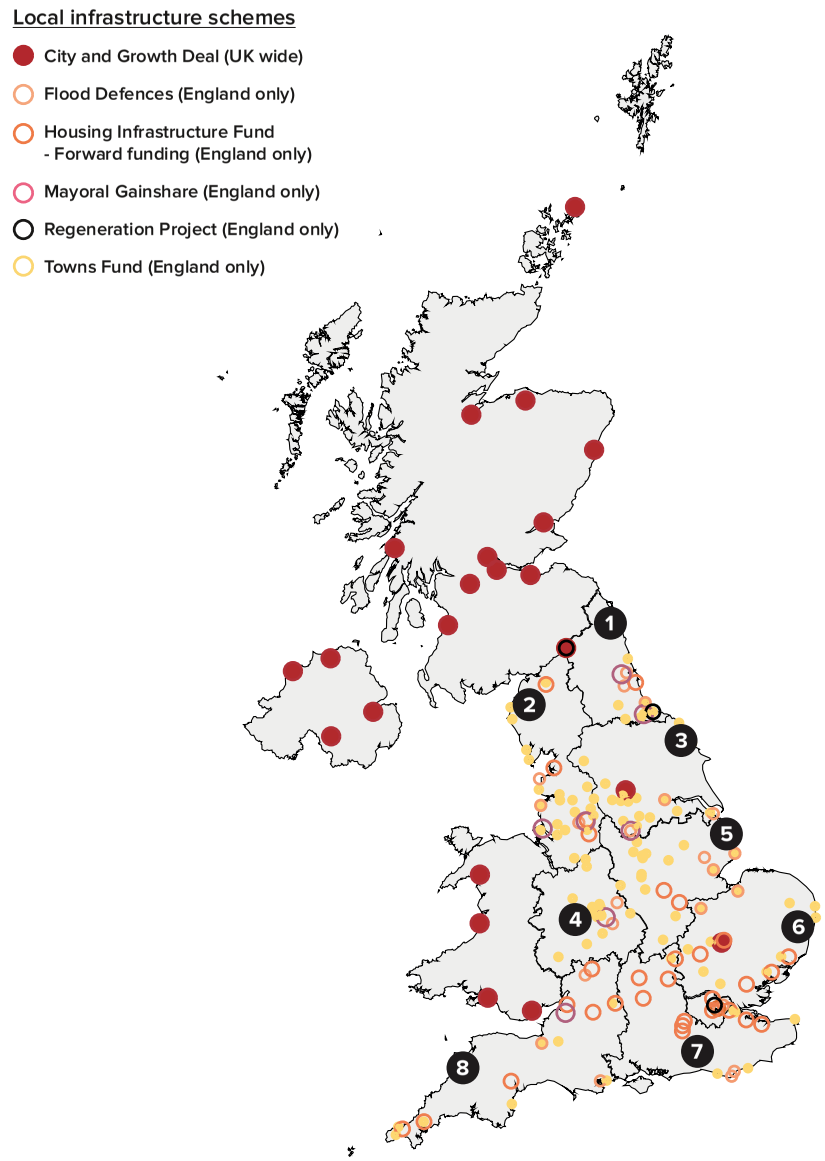
- Providing £39m to **Norwich** including a mobility hub at Norwich station, and £95m to **Cambridgeshire** and **Peterborough** to invest in public transport schemes.
- Building the Great Yarmouth Third River Crossing in **Norfolk** and Lake Lothing Third Crossing in **Suffolk**.

## 7 London & South East

- Providing £60m to **Portsmouth** and **South East Hampshire** including the relocation of Gosport bus station and taxi rank, and £63m to **Southampton** including new rapid bus links.
- Investing in the Lower Thames Crossing and financing the completion of Crossrail.

## 8 South West

- The **West of England** Combined Authority will benefit from intra-city transport settlements starting from 22/23.
- Providing £59m to **Plymouth** including £12m to improve walking and cycling, and £79m to **Bournemouth, Christchurch & Poole**.
- Investing in the A303 Stonehenge scheme, and in MetroWest to improve rail services across **Bristol** and the surrounding region.



# Connecting nations and regions

HS2 is this government's flagship national transport project, forming the spine of the UK's transport network by delivering essential North-South connectivity between some of the UK's biggest and most productive cities. High-speed rail does not just affect those who ride it, but also releases capacity on the classic rail network, meaning better local train connections into the UK's great cities. Construction for Phase 1 from London to the West Midlands started earlier in 2020, and the Hybrid Bill for Phase 2a from the West Midlands to Crewe is expected to receive Royal Assent later this year.

This government is committed to building back better. In line with the recommendations of Douglas Oakervee's review, **the government has strengthened HS2 governance, including through a new ministerial taskforce.** This is providing greater oversight and control of delivery performance, ensuring that HS2 will be delivered on time and on budget, and supporting realisation of the benefits of the scheme.

**Through the Union Connectivity Review announced by the Prime Minister the government will bring its four great nations closer together by assessing options to improve transport links.** The review will be chaired by Sir Peter Hendy and report by summer 2021. It will involve extensive consultation with the devolved administrations and consider the quality and reliability of existing connections; long-term trends in demand and technological developments; the environmental impact of both the existing and proposed transport links; and how connectivity can support economic growth as the UK recovers from COVID-19. The report will provide recommendations on whether and how best to improve connections, and whether that should include additional infrastructure investment by the UK government.

The government will also revitalise the arteries as well as the spine of the country's transport network, recognising that regional, as well as national, connectivity is vital to uniting the UK. **The government will make the largest ever investment in England's strategic roads - £27.5 billion over this Parliament, a 60% increase on spending in the last five years.** This major investment will ensure that these national traffic corridors are well designed, delivered, maintained, and continue to serve all road users into the future.

New upgrades will include: dualling the A66 between Penrith and Scotch Corner and halving the construction time as part of Project Speed; upgrading the A46 Newark bypass in the East Midlands; building a new Lower Thames Crossing; and building a two-mile tunnel on the A303 at Stonehenge to speed up journeys and enhance the World Heritage Site. The second Road Investment Strategy is focussed not just on road users, but on fulfilling the government's obligations to communities living close to major routes and towards the natural, built and historic environments. All of this money will generate Barnett payments to the Scottish Government, Welsh Government and Northern Ireland Executive, so that they can follow suit.

The railways helped to build modern Britain, so as well as building HS2, the government is also boosting the classic rail network. **Over the remainder of Network Rail's 5 year settlement – Control Period 6 – the government will invest £17.5 billion to renew and upgrade the railway system, improving passenger journeys across the UK**. This will deliver on the NIC's recommendations by progressing the East West Railway.

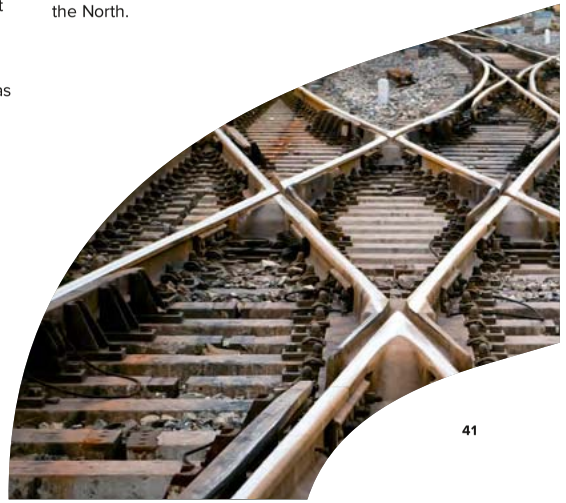
In 2017, the National Infrastructure Commission outlined the transformational economic potential of the Oxford-Cambridge Arc in its report 'Partnering for Prosperity'. At Spending Review 2020 the government has reaffirmed its commitment to the area, including additional funding to support the Budget 2020 commitments to develop a Spatial Framework to plan for long-term economic and housing growth and to explore the case for up to four Development Corporations along the route of East West Rail. This will help to deliver sustainable economic and housing growth, supported by infrastructure, that meets the needs of local people.

The government will also deliver on its manifesto commitment to spend £500 million to restore transport services previously lost in the Beeching cuts of the 1960s, including reopening the Ashington-Blyth line in Northumberland to passenger services, and restoring rail links to Okehampton in Devon. The government has also launched a New Ideas Fund to pay for feasibility work on proposals for new lines and stations.

Feasibility funding for the first ten schemes has been announced, which will provide a basis for decisions on further development: re-opening Meir Station in Stoke-on-Trent; the Barrow Hill line between Sheffield and Chesterfield; the Ivanhoe line between Leicester and Burton on Trent; branch lines on the Isle of Wight (Shanklin-Ventnor and Wootton-Newport); the Abbey line between St Albans Abbey and Watford Junction; Reopening Wellington and Cullompton railway stations; Bury-Heywood-Rochdale lines; Clitheroe to Hellifield railway line; reinstatement of rail access to Devizes via a new railway station at Lydeway; and the Waterside line (Hythe-Totton).The government will provide further feasibility funding for an additional fifteen proposals to inform decisions on further development: reopening Beeston Castle and Tarporley station in Cheshire, St. Anne's Park station in Bristol, and Ferryhill station in County Durham; reinstating links between Bolton, Radcliffe, and Bury; the Stratford-upon-Avon to Honeybourne/Worcester/Oxford line; new stations at Waverley in South Yorkshire and a station in the Langport/Somerton area of Somerset; improved services from Melton Mowbray and Falmouth; upgrading the South Fylde Line; the Maid Marian line between Nottinghamshire and Derbyshire; reinstating rail access to Cirencester; restoring services between Swanage and Wareham; the South Humber rail link; and a new link between Consett and Newcastle.

The government is also expanding the third round of the New Stations Fund to £32 million. This will fund the opening of railway stations at Edginswell and Thanet Parkway in Kent; and St Clears in Carmarthenshire. It will also provide funding to further develop proposals for stations at Haxby in York and Deeside in Flintshire.

The government is fully committed to improving connectivity between northern cities. Over the course of this year, the government has been drawing up an Integrated Rail Plan for the Midlands and the North of England, which will be published shortly. In line with the terms of reference, the Plan will ensure that Phase 2b of HS2, Northern Powerhouse Rail and other planned rail investments in the North and Midlands are scoped and delivered in an integrated way. This will bring transformational rail improvements more quickly and to more places, and will be informed by the NIC's assessment of the rail needs of the Midlands and the North.



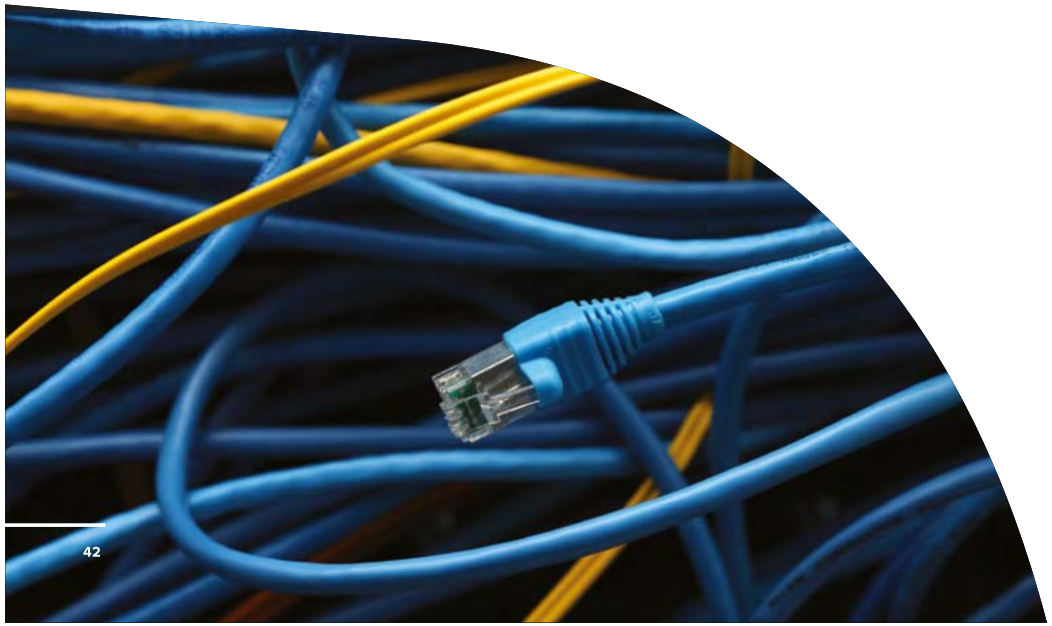
# Connectivity for a trading nation

International connectivity is important for linking businesses to valuable markets, and to support trade and investment.[21] The UK has the third largest aviation network in the world. Flights into UK hub airports connect the regions and nations of the UK to the world, enabling a more global Britain. Air connectivity also brings together the nations of the UK, and in 2019 over 19 million passengers flew on routes between England, Scotland, Wales and Northern Ireland.[22]

**The government last month launched the Global Travel Taskforce** to consider how the international travel sector could be supported through the specific challenges caused by the COVID-19 pandemic. It has since considered what steps we can take to facilitate business and tourist travel on a bilateral and global basis, through innovative testing models and other non-testing means, and more broadly what steps we can take to increase consumer confidence and reduce the barriers to a safe and sustainable recovery of international travel. This is alongside the already unprecedented package of measures announced by the Chancellor and available to the travel sector, including schemes to raise capital, flexibilities with tax bills and the extended furlough scheme.

The UK's freight system is one of the most efficient in the world, providing seamless transportation of goods into, out of and across the country, boosting economic growth. The government has announced that it will provide a full response to the NIC's *Better Delivery: The Challenge for Freight* report through the publication of a comprehensive cross-modal freight strategy in 2021. This will also consider the impacts on the freight system of the end of the transition period and the COVID-19 pandemic.

In preparation for the end of the transition period, the government has provided critical support to key ports around the UK through their surrounding Local Resilience Forums to mitigate any potential disruption and ensure continued seamless transit of freight in and out of the county. This has included development and implementation of essential traffic management plans, particularly around the Port of Dover and the Channel Tunnel, as well as upstream intervention to support and improve haulier preparedness ahead of the end of the Transition Period. The government has also allocated £200 million towards the Port Infrastructure Fund to ensure that ports across the UK have the necessary infrastructure in place for freight to continue to flow smoothly in and out of the UK.





# Doing things differently

The government is taking steps to reform how it invests in places, as well as what it invests in, to embed long-term change in policy making to level up and unleash the potential of the Union.

**Major policy interventions will be considered UK-wide**. The UK Internal Market (UKIM) Bill changes the government's powers to act in Scotland, Wales, and Northern Ireland. If passed, the UK Government will have concurrent powers to invest in infrastructure and economic development.

The government supports English devolution to strengthen local institutional structures and bring decision-making closer to the places impacted by those decisions. Nearly 40% of people in England now live in an area where devolution has transferred powers and funding from Whitehall to a directly-elected city region mayor.[23] The government will set out expanded devolution arrangements in the English Devolution and Local Recovery White Paper, building on the success of the directly-elected mayors who are driving economic growth across their functional economic areas, by ensuring mayors have the powers and responsibilities they need to shape their local area.

**The government is also taking steps to ensure national policy making is sensitive to local needs.** Through the government's Places for Growth programme, 22,000 civil service roles will be relocated from Whitehall by 2030 to address the regional imbalance in the civil service. The new National Infrastructure Bank will also be based in the north of England. In addition, the UK government will invest £210 million in 2021-22 in the Places for Growth and Government Property Agency hubs programmes, establishing more UK government hubs around the UK, enabling departments to further relocate out of London The government will deliver on its commitment at *Budget 2020* for an economic campus in the North of England.

To ensure the impact of policies on places is taken into account when choices are made, the government conducted a review into its guidance on appraising proposals regarding government spending, taxation and regulations (*the Green Book*). This will better link policies to government objectives, including levelling up.

# The Green Book Review

As announced at Budget 2020, the government has undertaken a review of the Green Book, to ensure that investment spreads opportunity across the UK. The Green Book is the government's guidance on best-practice appraisal and is therefore a vital tool for ensuring value for money for taxpayers.

A central finding of the review is that the appraisal process often fails to properly consider how a proposal will deliver the government's policy ambitions, including levelling up. This leads to appraisals being focused on a benefit cost ratio (BCR) that does not reflect social policy objectives or give ministers the information they need about where costs and benefits fall.

HM Treasury has therefore updated the Green Book to end the dominance of the BCR is decision making, starting with this Spending Review. Appraisals must give a comprehensive picture of cost and benefits, including non-monetisable, non-economic impacts. In particular, options will be assessed first and foremost on whether they deliver relevant policy objectives (for instance, the regeneration of a particular place). Any option which fails to do so cannot be considered value for money and will not progress to shortlisting stage.

The government is also changing the guidance so it will no longer be acceptable for proposals to be 'place blind'. Business cases should be developed to align with relevant local strategies and major interventions in the area. And for the first time, business cases for all proposals will have to set out how they will impact different places on a comply or explain basis.

These changes will be crucial to levelling up. They will mean that appraisals and advice to ministers should include much better analysis on how options deliver their policy goals, as well as which parts of the country look to gain most from them, supporting better-informed decisions.

These updates will feed into future Spending Reviews and HM Treasury will also roll out a tailored programme of training across Whitehall and beyond to ensure that the new Green Book guidance is fully embedded in future appraisals.

# Decarbonising the economy and adapting to climate change

## At a glance

As set out in the Prime Minister's *Ten Point Plan for a Green Industrial Revolution,* **infrastructure investment is fundamental to delivering net zero emissions by 2050**. The government will unlock private sector investment to accelerate the deployment of existing technology, such as retrofitting the UK's building stock and electrification of vehicles, while advancing newer technologies such as carbon capture and low-carbon hydrogen. **The government's approach will create jobs to support the recovery from COVID-19, and support the government's levelling up agenda by ensuring key industrial areas are at the heart of the transition to net zero**. The UK is already decarbonising faster than any other G20 country.[24] As hosts of the UN Climate Change Conference COP 26 next year, the UK will go even further to promote the importance of low-carbon infrastructure and support its commitment to the Paris Agreement.

**Key measures include:**

- Making significant investment in offshore wind and modern ports and manufacturing infrastructure to expand the share of generation from renewables;
- Providing up to £525 million to bring forward both large-scale nuclear and invest in the development of advanced nuclear technologies;
- £1 billion to support the establishment of carbon capture and storage in four industrial clusters;
- Investing £1.3 billion in charging infrastructure to accelerate the mass adoption of electric vehicles (EVs) ahead of ending the sale of new petrol and diesel cars by 2030;
- Promoting private investment and setting an enduring regulatory environment to promote energy efficiency;
- Enabling heat decarbonisation by supporting the roll-out of existing technologies like heat pumps and development of emerging technologies like hydrogen;
- Funding to help England to meet its share of the Climate Change Committee's recommendations to plant 30,000 hectares of trees a year in the UK; and
- Investing £5.2 billion by 2027 to better protect 336,000 properties and boost resilience of communities to the increased risk of flooding and coastal erosion resulting from climate change

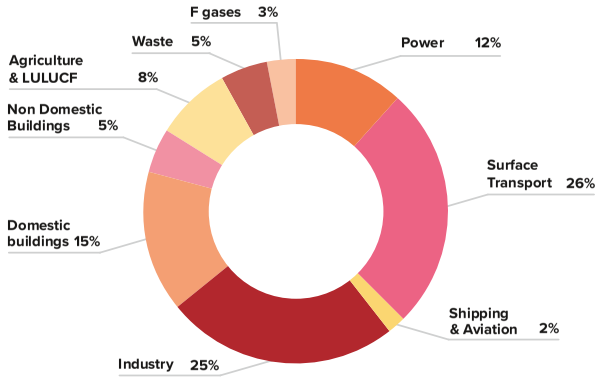
In June 2019 the UK became the first major economy in the world to legislate to end its contribution to global warming by 2050, in line with the UK's commitment to global climate action under the Paris Agreement.

**The UK's commitment to achieving net zero emissions by 2050 will require profound changes that will provide huge opportunities for the UK to build back better from COVID-19**. The UK will need strong, consistent and deliberate policy action to support the technologies that will reduce emissions.[25]

These changes will be economy-wide, and HM Treasury is currently undertaking a review into how the transition could be funded and where the costs could fall. An interim report will be published shortly and the final report in spring 2021.

The majority (over 80%) of the UK's emissions come from infrastructure sectors, and so action on infrastructure will be crucial for meeting the UK's Carbon Budgets and continuing progress towards the net zero target.[26]

**UK production emissions by sector (2019)**




Source: Department for Business, Energy & Industrial Strategy provisional UK emissions 2019, on a by source basis - mapped to Climate Change Committee sectors

The UK has already made considerable progress, reducing emissions by 45% since 1990 while growing the economy by almost 80% (as of 2019).[27] This has been achieved while minimising costs, causing a net reduction in household bills.[28]

The majority of contributions and investment so far has come from the power sector, where emissions have fallen almost 70% since 2008.[29] This has been driven through coordinated action by the private sector working closely with the government: regulated efficiency measures have reduced electricity consumption by 14%;[30] coal power generation has fallen from 30% to below 1% since 2014,[31] and the price of offshore wind has fallen by 55%.[32]

To go further, the UK will need to improve other aspects of its infrastructure in a way that more visibly alters people's lives, including how people heat their homes and travel around the country. **This Strategy sets out early actions that the government will take to build the infrastructure needed to achieve net zero, improve air quality, create a greener urban environment, and minimise the impact of flooding**. This includes significant progress on: carbon capture and storage, low-carbon hydrogen production, charging infrastructure for electric vehicles, offshore wind, and energy performance improvements in buildings.

In many cases the solutions needed are known and action needs to be taken immediately. Further progress will be made by accelerating the deployment of existing technology in the near-term, such as increasing wind generation or driving retrofit in the UK's building stock. These tasks will enable rapidly growing industries, creating jobs across the economy and boosting productivity.

For other areas, **new technologies and skills will need to be developed to continue decarbonising**. Since 2016, the government has made historic increases to public support for science. The UK's world-class institutions are already amplifying this scientific progress through curiosity-driven research and support for technologies. Looking ahead, the government will need to build on these strengths to drive both the development and deployment of new technologies, including:

- Low carbon hydrogen as a potential alternative to fossil fuel heating in industry and buildings, to store energy, a source of power, and for some modes of transport;
- Carbon Capture and Storage to remove up to 90% of the carbon dioxide emissions from gas-fired power stations and industrial factories, including those making hydrogen, as well as to support greenhouse gas removal technologies to offset some emissions from the hardest to decarbonise sectors;
- Technologies to remove carbon dioxide from the air, using 'direct air capture' or biomass, so that it can be used as an input to other processes, or stored; and
- Floating offshore wind to allow the harnessing of wind power across a greater proportion of the seabed.

Investment in these areas, where the UK has competitive advantage, can create the knowledge and skills needed for a green industrial revolution, driving leadership in the industries of the future, reducing national and global emissions, as well as providing the platform for significant economic growth. Where these investments are brought together to create place-based industrial clusters they can transform local economies, creating productive jobs, developing specialist skillsets, and attracting private investment. For example, the North East of England could become a home of choice for companies delivering carbon capture and storage; making hydrogen power a part of daily life; and designing, building and maintaining offshore wind turbines.

At the same time, **the country must adapt to the risks posed by climate change**. National infrastructure will be made resilient to future climate change by ensuring that its expected effects are fully considered at the design stage. This means addressing the likely impacts of higher temperatures, more extreme weather, and increased incidence of droughts, floods, and disease, and building in cost-effective mitigations over the whole life cycle of the asset now



# The government's approach

**Reducing emissions across whole sectors of the economy must be done in a sustainable way that minimises cost**. The benefits, opportunities and costs need to be shared across society and the economy must grow to enable the transition to be sustained, particularly as it recovers from the COVID-19 pandemic. **In November 2020, the Prime Minister laid out his *Ten Point Plan for a Green Industrial Revolution*. This strategy sets out how it will be delivered.**

The government cannot tackle this challenge alone. **Instead, the government will look to work closely with investors, industry and households**. This strategy sets out clear objectives and ambitions, to provide policy and regulatory certainty for project sponsors and investors to harness the transformational benefits that can be delivered by long-term private capital investment. The energy transition will be underpinned by harnessing private investment and innovation as new technologies become available, new markets are established and opportunities are created across the economy.

However, the full suite of policy levers will need to be deployed to encourage this private sector investment and create the appropriate market incentives to encourage competition and drive down costs, and to ensure that decarbonisation is achieved at the best possible value for money, with the right distributional balance of costs across consumers, taxpayers and the private sector.

**In the short-term, public financing will help to overcome barriers to investment in new technologies and ensure the costs are borne fairly across society, for example:**

- By using the government's unique position to support those risks where the private sector simply cannot, including in the development of financing and delivery models for complex and novel major infrastructure;
- By supporting trade exposed industries at risk of offshoring due to higher operational costs associated with decarbonisation technologies;
- By investing in fuel poor households and social housing to reduce bills for the poorest in society and protect the less able to pay; and
- By supporting the transition from R&D to deployment, driving forward innovation and encouraging UK companies to stay at the cutting edge.

**Now and in the longer term, creating the right regulation and tax measures will be imperative in driving competition and opening up new markets**. This will influence behaviour to address market failures, with a view to any government subsidies reducing over time as risks which once could not be borne by the private sector are mitigated. The Net Zero Review will analyse the range of choices for how households, businesses and the taxpayer could contribute towards the transition and evaluate the trade-offs between cost, competitiveness, effects on consumers and impacts on the taxpayer.

This chapter sets out the government's progress on this vision to date, across low carbon energy, industry, transport, buildings, resilience to climate change, and developing new and innovative technologies, as well as the strategy for moving forward.



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# Power

The decarbonisation of the power sector is a major success story from the past decade. It accounted for just 12% of emissions in 2019, down from 27% in 2008, mainly due to the growth of renewables and reductions in the use of coal in power stations.[33] Throughout this period, private investment has also underpinned substantial progress in reducing the cost of clean electricity and maintaining secure supplies.

The steady increase in renewable investments has been driven through a number of successful subsidy schemes and market reforms. Competitive auctions through the Contracts for Difference scheme have led to a dramatic reduction in the costs of offshore wind from £120/MWh in the first auction in 2015 to just £40/MWh in 2019.

While the total cost to consumers from low carbon levies has been significant, rising to around £10 billion a year in 2020, these have secured significant reductions in the cost of clean electricity and also put downward pressure on wholesale prices. Further deployment of renewables can be done in a more sustainable fashion without significantly higher costs to consumers.

Progress on decarbonisation in the power sector has also been driven by a consistent carbon price signal that has reduced the UK's reliance on coal generation from 30% to below 1% since 2014.[34] **The UK has committed to ending coal electricity generation no later than 2025** and is encouraging other countries to follow suit. The carbon price remains one of several efficient tools in driving decarbonisation.

The government has also ensured that security of electricity supplies remains paramount as the country decarbonises. Since it was established in 2014, the Capacity Market has helped maintain sufficient supply of electricity generation, providing generators with competitively auctioned contracts to be available at periods of peak demand. The UK is also building the first nuclear power station in a generation, at Hinkley Point, which will provide reliable low carbon electricity to power the equivalent of around six million homes a year once it is operational later this decade.

The 2050 net zero goal provides the trajectory within which the government will continue to decarbonise the power sector, while ensuring that the right balance is struck between reducing power sector emissions, maintaining the security of the system and ensuring electricity remains affordable for households and businesses.

To achieve net zero by 2050, the power system will need to be virtually carbon free and significantly larger to cope with the additional demand from electrification in transport, heating and some industrial processes. This expanded system will require increased investments in network infrastructure, sources of flexibility, such as interconnection, demand response and storage and enough low carbon generation capacity to provide the vast majority of the UK's electricity needs.[35]

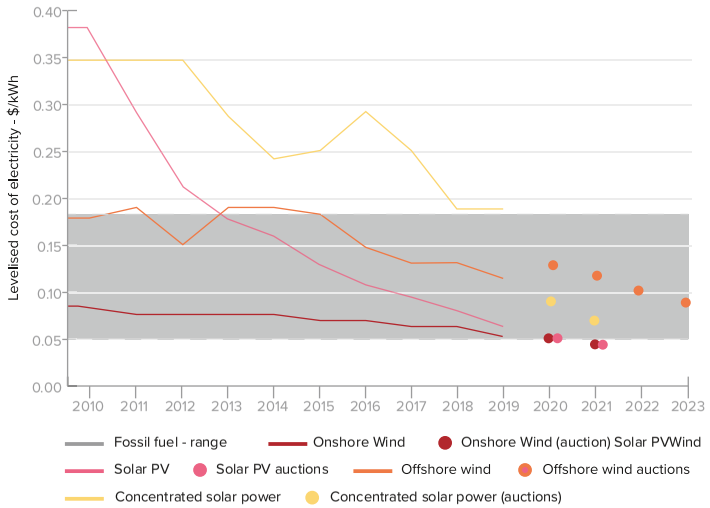
The bulk of this generation needed by 2050 will likely be provided by low cost renewables. However, given their intermittent nature there will also be a requirement for more reliable sources of power in the future energy provision of the UK. In particular, power generated from nuclear or power stations that burn hydrogen, or gas with carbon capture and storage. The government will therefore ensure private capital investment is able to continue to finance the energy transition and allow these technologies and network investments to come forward.

There will be decisions on how quickly capital-intensive energy infrastructure is deployed, where the government will ensure costs are minimised and distributed fairly across different groups. The Net Zero Review will look at these questions in more detail, and in spring 2021 will set out how the government will approach such distributional issues and ensure the UK benefits from the opportunities, as well as who bears the costs of the transition.



## Price of renewables globally

**Source: Climate Change Committee Progress Report 2020**




Around £20 billion a year is invested in the energy sector,[36] and there continues to be strong appetite for investment in sustainable energy projects with good environmental, social and governance credentials. The government has played a critical role in bringing technologies to market and reducing the cost of capital through the Contracts for Difference scheme. This competitive support mechanism is now well established and will help support the deployment of renewables as well as other forms of low carbon power.

Other financing models will also be vital to power sector decarbonisation. The Regulated Asset Base (RAB) model has played an important role in encouraging investment into complex infrastructure projects and the government is considering its replicability for energy projects such as nuclear power and carbon dioxide transport and storage.

## Renewables

To deliver net zero, the share of generation from renewables needs to dramatically increase. While the UK leads the world in the deployment of offshore wind, greater generation capacity will need to come from onshore wind and solar as well. As recommended by the National Infrastructure Commission (NIC), **the next auction round for Contracts for Difference in 2021 will include technologies such as onshore wind and solar PV.**

The government has also set out an increased ambition to achieve 40GW of offshore wind by 2030. To begin on this path and to increase the amount of renewable capacity needed to further decarbonise power, the government has announced an ambition for the 2021 Contracts for Difference Auction to support up to double the renewable capacity procured in the 2019 round, subject to maintaining competitive tension in the auction.

**The government will continue to support the deployment of renewables through competitive Contracts for Difference auctions every two years**, with the next due in 2021. Contracts for Difference have proven successful in reducing the cost of capital for renewable technologies, but this has insulated generators from price signals, potentially failing to incorporate the total system costs of intermittent renewables. As the NIC recommended, **the government will ensure that total system costs are considered in designing future Contracts for Difference rounds as far as possible and will publish a call for evidence on the evolution of the Contracts for Difference regime** to explore these issues further.

As renewables deploy at greater volumes it is likely that investors will look to the post-contract market revenues available and will wish to understand what the power market could look like with increasing zero marginal costs generation on the system. The government will continue to ensure that support mechanisms evolve to consider the total system benefits provided by competing generation technologies and flexibility solutions.

Building the sector has required considerable consumer-funded subsidies, which are forecast to reach over £10 billion annually by the end of the year. Following the 2019 auction, however, the latest offshore wind contracts are expected to deliver clean electricity at very low costs, and could even begin generating at below market prices when they start operating in the mid-2020s, meaning a better deal for consumers.

Consistent with the target of 40GW offshore wind by 2030, the government expects around 65% of electricity generated in Great Britain to come from renewable sources by 2030. However, the need to ensure that generation can be brought forward sustainably and at least cost to consumers, and that the sector contributes appropriately to the UK's overall climate goals, means that this is not a strict renewables target.

In partnership with industry, the government will enable the UK to harness more of the economic benefit from the accelerated deployment of renewables technologies, alongside the clean electricity it produces. The Offshore Wind Sector Deal with the renewables sector continues to support these efforts.

As a greater number of offshore wind farms are deployed off the British Isles, there will be many jobs created across the UK. To harness the potential of this new industry **the government has announced £160 million to upgrade UK ports and manufacturing facilities**. This infrastructure funding could help the sector support up to 60,000 direct and indirect jobs by 2030. The offshore wind industry has set a target in its Sector Deal, to secure 60% UK content for the offshore wind supply chain. The government will consult on the introduction of more stringent supply chain plan requirements in future Contract for Difference, including consequences for non-delivery.

**The government has also committed to support the development of floating offshore wind**, setting a target of 1GW deployment by 2030 to ensure the UK establishes a leadership position in the next generation of offshore wind technology.

## Nuclear

Nuclear power has long played an important role in UK power generation and will continue to do so provided it can be delivered to time and budget. Hinkley Point C will be the UK's first new nuclear plant in a generation, and has continued construction throughout the pandemic by adapting to new working environments.

Nuclear is a proven, value-for-money source of reliable low carbon power which can complement renewables. **The government is pursuing large-scale nuclear projects**, subject to clear value for money for both consumers and taxpayers and all relevant approvals, with further details to follow in the *Energy White Paper*.

As outlined in the *Ten Point Plan for a Green Industrial Revolution*, **the government will provide up to £525 million to bring forward large-scale nuclear and invest in the development of advanced nuclear research and development** (R&D), including up to £385 million in an Advanced Nuclear Fund for small modular reactors and advanced modular reactors. This is alongside £220 million for nuclear fusion.

Last year, the government consulted on a nuclear Regulated Asset Base (RAB). The government is considering the responses to this consultation and expects to publish a response in due course. Alongside considering the RAB model the government will also continue to consider the potential role of government finance during construction, provided there is clear value for money for consumers and taxpayers.

## Carbon capture and storage

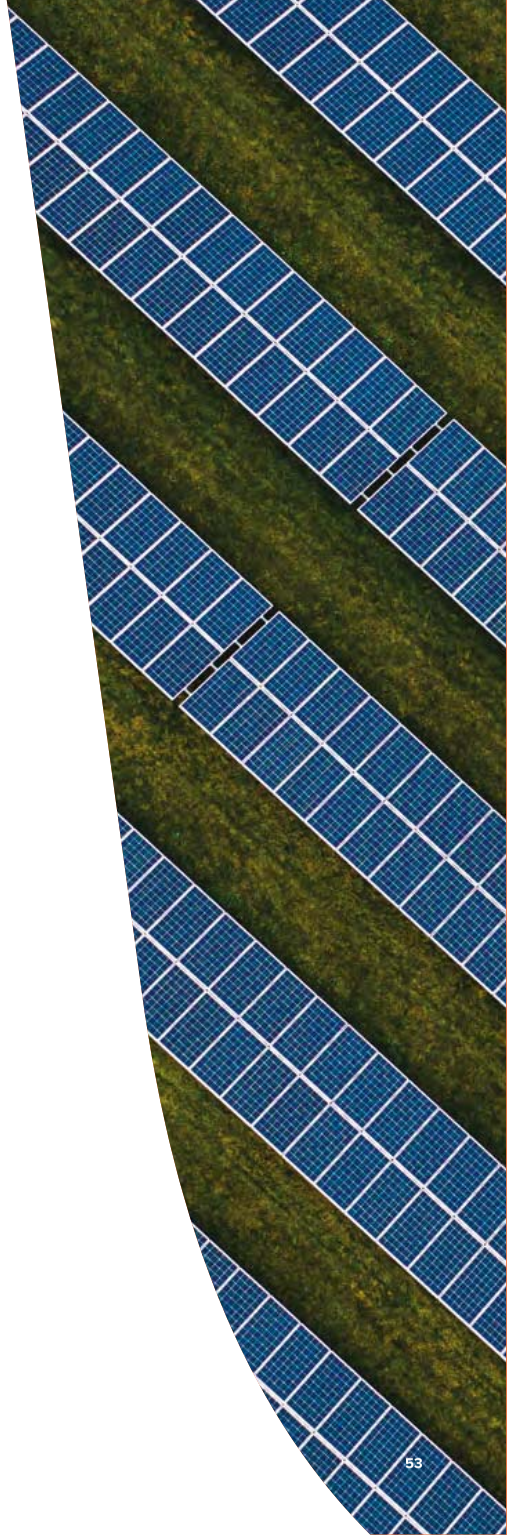
Carbon capture and storage (CCS) will be essential for net zero. Power stations with CCS technologies could provide valuable low carbon electricity when renewables are not generating by capturing the emissions from biomass or gas-powered power generation. CCS will also be essential to decarbonising large parts of industry, producing low emissions hydrogen and in delivering greenhouse gas removal technologies, permanently locking away carbon dioxide.

However, the technology has not been delivered at scale and significant risks remain. Therefore, the government will play a central role in bringing forward this complex infrastructure in partnership with industry over the next decade. The CCS Action Plan sets out the ambition to deploy CCS at scale in the 2030s.[37]

To help deliver on the government's ambitions, Budget 2020 announced that the government will establish CCS in at least two UK sites, along with at least one CCS power station, using consumer subsidies.

The government is now increasing that ambition, and will:

- **Invest £1 billion to bring forward four CCS clusters by the end of the decade, with two to begin construction by the mid 2020s;**
- **Set an ambition to capture 10 megatons of carbon dioxide per year by 2030**; and
- **Outline further details in 2021 on a revenue mechanism to bring through private sector investment** into transport and storage, power and industry CCS and hydrogen projects via new business models to support these projects.



## Hydrogen

Hydrogen is a flexible energy carrier that can be burnt as a gas or used in a fuel cell to generate heat or power. It is a leading technology option for decarbonising heavy industry, and could be used to reduce emissions in hard-to-abate modes of transportation, such as heavy goods vehicles or shipping. Almost none of the hydrogen used in the UK today is low carbon, and it is mostly used in the petrochemical sector.

In order to realise the potential of hydrogen the **government is establishing a £240 million Net Zero Hydrogen Fund**. This will provide capital funding to support deployment of low-carbon hydrogen production in the UK, and will support both methane reformation with CCS ('blue' hydrogen), and electrolysis using renewable electricity ('green' hydrogen). Working alongside partners in industry, the government's aim is for the UK to develop 5GW of low carbon hydrogen production capacity by 2030, with a mixture of 'blue' and 'green' hydrogen.

Next year, **the government will set out its approach to growing the hydrogen economy, through a UK Hydrogen Strategy.** The strategy will consider how to continue support for the scale up of low carbon hydrogen production, as well as the interaction with storage, distribution and potential end use demand. It will set out how the UK can capture economic benefits from building a resilient domestic supply chain.

This will include details of hydrogen business models and a revenue mechanism for bringing through private sector investment, to ensure low carbon hydrogen can play a key role in the UK's economic recovery and achieving net zero. It will also set out how the government will support the hydrogen and CCS industries side by side, in conjunction with support for the demand side such as heating trials and support for hydrogen in shipping.

## Network reform

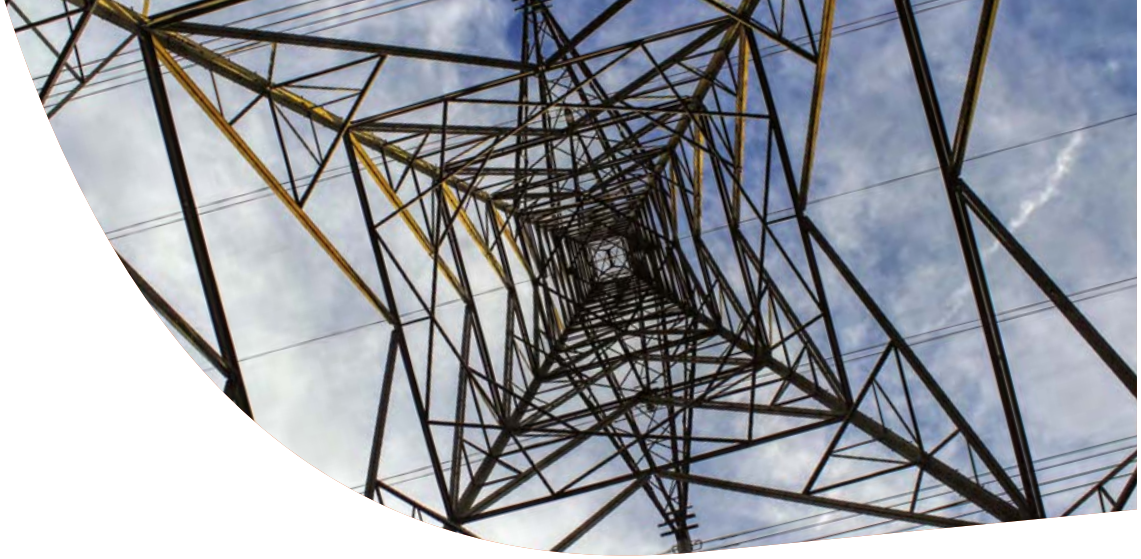
As the 2017 Cost of Energy Review and the NIC have pointed out, there is scope for greater competition in delivering the onshore network infrastructure upgrades the UK will require as the energy system decarbonises. Network operators will therefore be required to make investment decisions that are best for the operation of the whole system rather than their own network. The government will outline plans on onshore networks in the forthcoming *Energy White Paper*, including plans to legislate to introduce competition.

The government has already worked with National Grid and Ofgem to give more independence to the transmission system operator for electricity, and expects to see distribution networks take a more active role in system operation. **The government will review the right long-term role and organisational structure for the Electricity System Operator,** in light of the reforms to the System Operator instituted in April 2019. It is possible that there will need to be greater independence from the current ownership structure, should it be appropriate to confer additional roles on the System Operator.

As the power system evolves, the government will need to consider how its own role, as well as the roles of the regulator, the Electricity System Operator, network operators and other energy market participants will change over time. **The *Energy White Paper* will set out the government's approach on the overall governance of the system.**

The evolution of the power system will also require the evolution of the networks to deliver power to people's homes and businesses and to ensure this infrastructure does not hold back the transition to electric vehicles, cleaner sources of heat or greater renewables on the grid. To enable this, government and the regulator will continue to ensure there is a common understanding of the future strategic direction to align policy objectives while maintaining the regulators' independence. If achieved, this approach could provide investors with greater certainty over longer-term investment decisions and support the transition of the energy network.





# Industry

Industry accounted for 25% of emissions in 2019.[38] Since 1990, emissions have more than halved due to reductions across all parts of industry, including manufacturing, construction and fossil fuel supply.[39] In the manufacturing sector, greenhouse gas emissions fell by 25% between 2009 and 2017. Analysis from the Climate Change Committee (CCC) suggests this is due to the changing structure of the UK's manufacturing sector, as well as improved energy efficiency and a shift to low carbon fuels.[40]

A mix of technologies will be needed to fully decarbonise industry, because there is a wide variety of sources of emissions across sectors. Options include CCS, electrification of heating, and using hydrogen as a low carbon fuel. These will be considered in the context of changes in the energy sector.

Around half of manufacturing sector emissions in the UK come from major industrial clusters, and targeted public investment in shared infrastructure will help turn these areas into world-leading centres of low-carbon manufacturing, creating jobs and export opportunities.[41] Alongside this, firms will also need to make their processes more energy efficient. **The £315 million Industrial Energy Transformation Fund will support early adoption of energy efficiency and deep decarbonisation projects in energy intensive industries**.

Most energy intensive industries currently receive free allowances under the EU Emissions Trading System (ETS). When the UK leaves the EU, the UK will adopt a replacement carbon pricing system, which will include similar mechanisms to free allocation.

Many of the sectors that receive free allowances are particularly exposed to international trade, and bearing all the costs of decarbonising could be a risk to their competitiveness. As part of the *Industrial Decarbonisation Strategy*, to be published in spring 2021, the government will consider what demand-side policies can drive emissions reductions in industry. These could include developing the market for low carbon industrial products, for example through introducing new product standards to drive demand.

**The government will also consider what role fiscal measures should play in supporting industry**. As well as up-front capital support for CCS and low-carbon hydrogen production, **the government will set out new business models for industry carbon capture and hydrogen to enable private sector capital investment and support firms' longer-term operating costs**. The government's role will evolve over time, with subsidy reducing as technology matures, supported through an increasing carbon price. The government will consider what trade and diplomatic levers could be used to protect the competitiveness of UK industries as they decarbonise.

# Transport

Transport is the highest emitting sector of the UK economy, accounting for 28% of domestic emissions in 2019.[42] Reducing emissions from all modes of transport will therefore be key to achieving the UK's net zero target in 2050. The government is committed to going further and faster to tackle climate change, which is why **the Department for Transport is developing a bold and ambitious Transport Decarbonisation Plan to achieve net zero emissions across all modes of transport**. This Plan will be the biggest piece of work the government has ever done to tackle greenhouse gas emissions from transport. The holistic and cross-modal approach to decarbonising the entire transport system will set out a credible and ambitious pathway to deliver transport's contribution to carbon budgets and meet net zero by 2050.

Road transport is responsible for over 90% of domestic transport emissions and is also one of the biggest contributors to poor air quality in the UK's towns and cities.[43] Decarbonising road transport is therefore particularly important for meeting the interim carbon budgets, as well as cleaning up the UK's air.

To help achieve this, **the Prime Minister has announced that new petrol and diesel cars and vans will not be sold after 2030**. Between 2030 and 2035, any new cars and vans sold with tailpipe emissions should be capable of driving a significant distance with no carbon emissions from the tailpipe. All cars and vans sold after 2035 will be fully zero emissions at the tailpipe. The government will increase the uptake of zero emission vehicles with a package of regulation, incentives and investment in electric vehicle (EV) charging infrastructure, delivered in partnership with the auto sector, consumers and the growing chargepoint industry. As set out by the Prime Minister, in moving forward with this transition the tax system will need to encourage the uptake of EVs and that revenue from motoring taxes keeps pace with this change, to ensure the government can continue to fund first-class public services and infrastructure.

The EV charging ecosystem will be one of the UK's green industries of the future, and the government wants to maximise private sector investment in the delivery of charging infrastructure. However, recognising that it is a new market and that availability of charging infrastructure is a barrier for two thirds of drivers considering the switch to EVs, **the government will kickstart the delivery of a core rapid charging network across motorway and key A road service stations**. By 2023 the government expects to see a high-powered charging hub at every motorway service area, installed by the private sector.

To ensure the private sector can continue to expand the charging network at pace in the 2020s, **the government will invest £950 million in future proofing grid capacity along motorways and key A roads** to prepare for 100% uptake of zero emission cars and vans ahead of need.

**The government will also extend support for chargepoint installation at homes, workplaces and on-street locations**, but reform these schemes so that they target difficult parts of the market such as leaseholders and Small and Medium Enterprises (SMEs). **Finally, the government has committed £90 million to fund local EV charging infrastructure** to support the roll out of larger, on-street-charging schemes and rapid hubs in England.

Alongside this investment, the government will be consulting on regulations to improve the consumer experience at public chargepoints later in 2020. There are four core areas in the consultation, including payment methods and payment roaming, opening up chargepoint data, increasing the reliability of the charging infrastructure and ensuring pricing transparency. In 2019 the government consulted on proposals to require all newbuild residential properties with associated parking (including a block of flats with an associated car park) to have an EV chargepoint. The government also consulted on requiring all new non-residential properties, with more than 10 parking spaces, to have at least one chargepoint and cable routes for a further one in five spaces. The government will respond to the consultation soon, with regulations being laid in 2021.

At the start of this year, before the COVID-19 pandemic, EV market share had tripled compared to last year, and has held up through the course of the year. To further incentivise drivers to make the switch to an EV, the government uses the tax system to encourage the uptake of cars with low carbon dioxide emissions, which is why users of zero and ultra-low emission cars have beneficial Vehicle Excise Duty (VED) and company car tax rates (CCT) in comparison to conventionally fuelled vehicles. Following Budget, from April 2020, zero emission cars pay no VED at first registration or subsequently. **The Spending Review confirms the government will continue the Plug-in Car, Van, Taxi and Motorcycle Grants until 2022-23**, increasing funding by over £200 million compared to budget 2020, to £582 million in total.

As well as decarbonising private vehicles, the government wants to increase the share of journeys taken by public transport, cycling and walking, and decarbonise buses and trains. Supporting greener buses is another key part of the government's agenda for achieving net zero and tackling air pollution. London now has the largest fleet of electric buses in Europe,[44] and the UK is one of the world's leading designers and exporters of buses. The Prime Minister announced in February that the government would deliver a further 4,000 zero emission buses. **The Spending Review confirms £120 million to deliver an additional 500 zero emission buses in 2021-22**. This builds on up to £50 million investment in the first All Electric Bus Town, which will be announced early next year and is expected to deliver around 300 zero emission buses, supporting greener and cleaner journeys.

Where it is less certain what technology will provide the most effective route to decarbonisation or where it is unclear how the technology can be scaled commercially, the government will fund R&D programmes to support innovation.

Innovation will play a crucial role in decarbonising domestic shipping, for which emissions are likely to be reduced mainly through the scale adoption of alternative fuel systems like hydrogen and ammonia. **The government will provide £20 million in 2021-22 to enable a UK network of technology demonstrations in alternative marine fuels and green shipbuilding**, including hydrogen vessels trials in Orkney and groundworks for a hydrogen port in Teesside. In parallel, the government will consider whether and how the Renewable Transport Fuel Obligation could be used to encourage the uptake of low carbon fuels in maritime, taking the availability of sustainable resources, competing uses and the international character of the maritime sector into consideration.

**£21 million will also be provided for the decarbonisation of aviation**, through supporting sustainable aviation fuels and zero emission flight infrastructure. This work will be overseen by the recently established Jet Zero Council, a partnership between government and industry to drive the delivery of new technologies and innovative ways to cut aviation emissions. This will fund a one-year competition to support the development of a Sustainable Aviation Fuel (SAF) Demonstration and first-of-a-kind commercial plants. This funding will also kickstart the establishment of a clearing house for SAF, the first of its kind in Europe, to certify new fuels and develop UK expertise. The government will also consult on introducing a SAF mandate. Funding for the Aerospace Technology Institute, which provides match-funding to stimulate the development of innovative and more efficient aircraft technologies, has also been extended.

The UK's airspace is an essential, but invisible, part of its national transport infrastructure. **The government is therefore committed to modernising UK airspace, which will deliver quicker, quieter and cleaner journeys and more capacity** for the benefit of those who use and are affected by UK airspace. The government will continue to co-sponsor the airspace modernisation programme with the Civil Aviation Authority. This will ensure that carbon savings for aviation can be realised though proven technology this decade.

Freight also contributes to pollution and congestion in the UK's urban areas which, left unchecked, will only get worse. The government supports the NIC's recommendations in this area, and believes that through the adoption of new technologies and better recognition of freight's needs in the planning system, it is possible to decarbonise freight by 2050 and manage its contribution to congestion.

Unlike lighter goods vehicles, such as passenger cars and vans, there is currently not a commercially viable path to decarbonise heavy goods vehicles (HGVs) which contribute 17% of UK transport emissions.[45] To support the sector to make the transition to zero emission vehicles, the government will invest £20 million in 2021-22 to establish zero emission road freight trials. These will assess the most effective and commercial path to decarbonising HGVs. The government will also consult on a phase out date for the sale of diesel HGVs.

The government has announced that it will provide a full response to the NIC's Better Delivery: *The Challenge for Freight report*, through the publication of a comprehensive cross-modal freight strategy. This strategy will be published in 2021 and will consider the impacts on the freight system of the end of the transition period as the UK leaves the European Union and the COVID-19 pandemic. Since the publication of *Better Delivery* in April 2019, progress has been made against the recommendations in the report, including on:

- **Better land use planning**: through provision of guidance on how local authorities can assess need and allocate space for logistics in the *Housing and economic needs asssessmen*t, July 2019; and and
- **Data and analysis**: through the ongoing development of a freight mapping tool to enable the UK's freight networks to meet growing demands for faster deliveries while reducing its impact on congestion and the environment. The discovery phase of this project will conclude in December, with further work planned for 2021.

The government has also recently established a Freight Council to provide a forum for discussion with industry stakeholders from all parts of the freight sector. The forum met frequently in the first half of 2020 and will meet quarterly going forward, with a focus on long-term strategic issues for the freight sector.

# Buildings

Emissions from UK buildings have declined steadily over the past 20 years, falling 25% since their peak in 2001 due to a range of government interventions and actions by the private sector, many of which have also reduced energy bills.[46]

## These include:

- Improving the energy performance of homes through the Energy Company Obligation and public sector buildings through the Public Sector Energy Efficiency Scheme;
- Supporting the roll-out of low carbon heat through the Renewable Heat Incentive;
- Kickstarting the heat networks market through the £320 million Heat Networks Investment Project;
- Setting stretching efficiency standards for new gas boilers;
- Raising minimum standards for both new and existing buildings, and energy related products;
- Introducing minimum energy performance standards for domestic and non-domestic private rented properties and;

- Requiring large businesses to carry out audits every 4 years under the Energy Saving Opportunity Scheme (ESOS), covering buildings, industrial processes and transport, to identify cost-effective energy saving measures.

## This year so far, the government has announced further measures to continue this progress, including:

- **Over £3 billion to make homes and buildings greener and more energy efficient** through the Green Homes Grant, Public Sector Decarbonisation Scheme and Social Housing Decarbonisation Fund demonstrator;
- **The introduction of a Future Homes Standard**, in the shortest possible timeframe before 2025, which will ensure new build homes are future proofed with low carbon heat and world leading levels of energy efficiency and consult shortly on increased standards for non-domestic buildings;
- **A new Green Gas Support Scheme** to support the production and injection of green gas (biomethane) into the grid, funded through a Green Gas Levy, and a £270 million Green Heat Networks Scheme, enabling new and existing heat networks to be low carbon and connect to waste heat that would otherwise be released into the atmosphere; and
- **Support for households and small businesses to invest in heat pumps** through a Clean Heat Grant scheme, backed by £100 million of funding.

These policies are driving growth in the energy efficient and low carbon heat sector, with the Office for National Statistics (ONS) estimating 114,000 were employed in the sector in 2018, an increase of 59% since 2015 with a turnover of £16.7 billion.[47]

However, the UK continues to have some of the oldest and least energy efficient homes in Europe, and the sector continues to make up 23% of total UK emissions meaning that more ambitious and urgent action is required in this Parliament.[48]

To meet the UK's climate goals, the pace of heat decarbonisation and energy efficiency improvement needs to accelerate. 85% of homes are currently on the gas grid, but to get to net zero, the vast majority will need to stop burning natural gas.[49] This will require further improvements in the energy efficiency of buildings, repurposing the grid to green gases (biomethane or hydrogen), moving to non-grid low carbon heat sources (primarily heat pumps), or to hybrid systems that combine the two. It is not yet clear which of these routes will be best, and it is possible that a variety of solutions will be required for different properties, or in different areas of the country. Making the decision too quickly may lead to inefficient investments and sub-optimal path dependency while uncertainty remains high.

However, with boilers lasting roughly 15 years on average, 2050 is only two heating system replacements away. **Therefore, by the early 2030s the UK needs to be in a position to ensure that the estimated 1.7 million new heating systems being installed each year are ready for net zero. Today, that number is nearer 30,000**. It is therefore necessary to take the steps now to inform decisions about what kind of installation must be made.

In relation to hydrogen, that means supporting activity to determine its safety and feasibility. This includes delivering hydrogen heating trials, where the government is investing £81 million with the goal of beginning a neighbourhood trial by 2023 and a large village trial by 2025. For heat pumps, it means taking large scale 'no regrets' actions which are necessary in all scenarios and can lead to lower consumer bills, reduced fuel poverty and a thriving industry. This includes ramping up the domestic heat pump market to 600,000 installations by 2028, growing heat networks, and improving the energy efficiency of the UK building stock. This will require strong regulation to drive behaviour change and investment from those able to pay, while ensuring that the government supports those who need it.

Action will also be required in the non-domestic sectors. Through the Public Sector Decarbonisation Fund, **the government will continue to take the necessary steps to improve schools, hospitals, prisons and other public buildings**. The government will consult on future building standards and in-use energy performance requirements for non-domestic buildings, and publish a response on non-domestic private rental sector buildings regulation.

More detail on how the government plans to use a combination of regulation and targeted spending to stimulate the energy efficiency market over the next decade, and encourage greater use of clean heat, will be set out in the forthcoming *Energy White Paper, Hydrogen Strategy,* and *Heat and Building Strategy.*

# Climate change adaptation

Infrastructure for energy, water, transport and communications underpins activities across society and the economy, yet may be directly or indirectly vulnerable to climate change risks. The second *Climate Change Risk Assessment* (CCRA), published in 2017 identifies the key climate risks to infrastructure, including from groundwater flooding, coastal flooding and erosion, embankment failure, high winds, lightning as well as cascading failures from infrastructure interdependencies.

In the second National Adaptation Programme, the government set out a vision to develop an infrastructure network that is resilient to today's natural hazards and prepared for the future changing climate. The government engages with the Infrastructure Operators Adaptation Forum, a network coordinated by the Environment Agency, Climate Change Committee and National Infrastructure Commission. The Forum enables learning and the sharing of best practice on actions to reduce vulnerability and realise opportunities around interdependencies between infrastructure systems. In addition the government supports and builds capability of organisations reporting under the third cycle of the Adaptation Reporting Power, which opened in January 2019 and runs until Jan 2021. Over 90 organisations have confirmed their participation in this reporting round, including infrastructure operators responsible for energy, water, telecoms, road, rail and ports.

**In the 25 Year Environment Plan, the government committed to ensure that all policies, programmes and investment decisions consider the possible extent of climate change this century**. As part of ensuring this approach is embedded in policy and programme decisions, the government has revised the *Green Book Supplementary Guidance on Accounting for the Effects of Climate Change* to include updated information on climate evidence and assessments.[50] This guidance is an important tool in supporting departments to meet the Green Book requirement to consider climate risks in policy, programme and investment decisions where appropriate.

The increasingly interdependent nature of the UK's critical infrastructure means that the need to identify and limit cascading risks is only becoming more important. Climate change impacts may result in risks within and between critical national infrastructure sectors.

# Nature-based solutions and waste

Climate change has severe implications for natural habitats and biodiversity loss, and it is essential that these twin threats are tackled in parallel. The Review into the Economics of Biodiversity is considering the question of how economic prosperity can go hand in hand with addressing biodiversity loss in a global context. Domestically, nature-based solutions have an essential role to play both in climate mitigation and adaptation. Healthy and restored ecosystems lock away more carbon in plants and soils than degraded ones, while also supporting a more diverse and abundant range of flora and fauna.

**The government's Nature for Climate Fund (NCF) will help England to meet its share of the CCC's recommendations to plant 30,000 hectares of trees a year in the UK**. Woodlands and urban trees are vital green infrastructure which offer carbon capture as well as a wide range of natural capital and public amenity benefits such as clean water, natural flood alleviation, biodiversity, and urban cooling. **The government will extend the Urban Trees Challenge Fund and invest in Community Forests**. The NCF will also help to restore more peatlands, locking in carbon while providing wider benefits for biodiversity and water. Further detail will be set out in the England Tree Strategy and England Peat Strategy next year.

The UK also needs to go further in increasing its resource-use efficiency, to reduce the burden placed on the natural world through the supply of raw materials and absorbing waste. **The Environment Bill is legislating wide-reaching waste reforms** – including extended producer responsibility (EPR), a deposit return scheme, and consistent collection of food waste and recycling - which will increase resource-use efficiency and cut greenhouse gas emissions from their implementation in 2024. EPR will ensure that the costs of processing packaging waste are transferred from local authorities to manufacturers and sellers. This will encourage innovation in packaging design, leading to a more sustainable use of resources.

In order to prevent the build-up of waste, it is important to be able to follow its journey through supply chains. New waste tracking technology in the UK is the future of a high-tech circular economy underpinned by world class digital infrastructure, and will ensure that all waste movements across the economy can be tracked, supporting resource efficiency as well as informing sustainable future infrastructure investment.

# Water and flood risk management

Climate change will continue to increase the risk that there is too much or too little water in the environment – leading to a higher frequency of flooding and drought. Both extremes in weather can cause significant damage and disruption to communities, homes, land and infrastructure.

While it will never be possible to prevent all flooding, taking clear action now to boost nationwide resilience will ensure the impacts from flood events can be minimised and communities can recover more quickly when they do happen. In July 2020, the Secretary of State for the Environment published the government's long-term Policy Statement on flood and coastal erosion risk management.[51] The Policy Statement outlines five ambitious policies and over 40 supporting actions to better protect and prepare the country against flooding and coastal erosion. Alongside the government's policy statement, the Environment Agency published their updated National Flood and Coastal Erosion Risk Management Strategy for England.

At the heart of the government's strategy is its flood and coastal defence investment programme, which provides longer-term certainty of funding, unlocking even greater efficiency in infrastructure investment. Devolved administrations receive funding in-line with the investment. **The March 2020 Budget announced that, from 2021, the amount invested in the flood and coastal defence programme in England will double to £5.2 billion, delivering 2,000 new defence schemes to better protect 336,000 properties over six years**. This investment will reduce national flood risk by up to 11% by 2027 helping to avoid £32 billion of wider economic damages – benefitting every region of the country. This exceeds the level of investment recommended by the NIC, underlining this government's commitment to ensuring homes and businesses across the country are better protected from the devastating impacts of flooding.

Alongside this commitment, **the government announced a transformative £200 million Flood and Coastal Resilience Innovation Programme**. Through this new programme, managed by the Environment Agency, over 25 local areas in England – urban, rural and coastal, from the North, the Midlands and the South – will be selected to take forward wider innovative actions that improve their resilience to flooding and coastal erosion.



The government agrees with the NIC that there must be a twin track approach to delivering additional water supply and demand reduction to increase the resilience of water supplies. Water companies are responsible for planning to meet future supply requirements through the production of water resource management plans. For the next round of plans due in 2024, **the government will require the water industry to plan to deliver resilience to a one in 500-year drought.**

The Environment Agency published a National Framework for water resources in March 2020, and will support water companies to plan regionally and with other sectors to achieve the right balance of measures to increase resilience. At Price Review 2019, Ofwat agreed up to £469 million of funding for water companies between 2020 and 2025 to progress work on new strategic water resource and transfer infrastructure, as identified in company Water Resources Management Plans. Ofwat has established the Regulators' Alliance for Progressing Infrastructure Development (RAPID) to support this process and overcome barriers which might hamper the development of these strategic schemes.

As well as new infrastructure, the government recognises that demand on water supply must be tackled through reducing the amount of water lost through leaks and reducing the volume consumed by customers. **The government is exploring the possibility of a statutory target to reduce water demand using powers in the Environment Bill**. This would be on the volume of water distributed or abstracted by water companies, encompassing household use, non-household use and leakage. In line with the NIC's recommendations, the water industry has also committed to reduce leaks by 50% by 2050.

# Innovative technologies

Since 2016 the government has increased public investment in science and innovation to historic levels. These investments have enhanced understanding of the social, environmental and economic implications of future energy options, helping to create a whole system approach to net zero. This support is helping to bring new innovations to the market. For example, cheaper and more efficient fuel cells and new sustainable biofuels, underpinning the net zero transformation.

**At the Spring Budget, the government committed to at least doubling the size of the Energy Innovation Programme**. The Energy Innovation Portfolio (now the Net Zero Innovation Portfolio) is designed to reduce the costs of decarbonisation by developing and accelerating near-to market low-carbon energy technologies that will be necessary to achieve net zero emissions by 2050. The portfolio is targeted at the development and demonstration end of the R&D spectrum to bolster technologies such as floating offshore wind, hydrogen and advanced modular nuclear reactors and stimulate private sector investment.

**The government is making £200 million of this funding available in 2020-21.** Through this programme the government expects to bring down the costs of deploying innovative near-to-market technologies, such as hydrogen. It will also support the commercialisation of new types of firm low carbon power to become available in the 2030s and 2040s, such as inter-seasonal storage, and less intermittent forms of renewables, such as floating offshore wind.

This investment will support leading researchers and innovators from all four nations to discover and create the industries of the future. This funding will boost R&D activity from discovery research to demonstration. Supporting the UK to seize the opportunity of scientific progress to deliver new transformative technologies, enhance the efficiency of existing approaches and support the adoption of emerging technologies across the country.

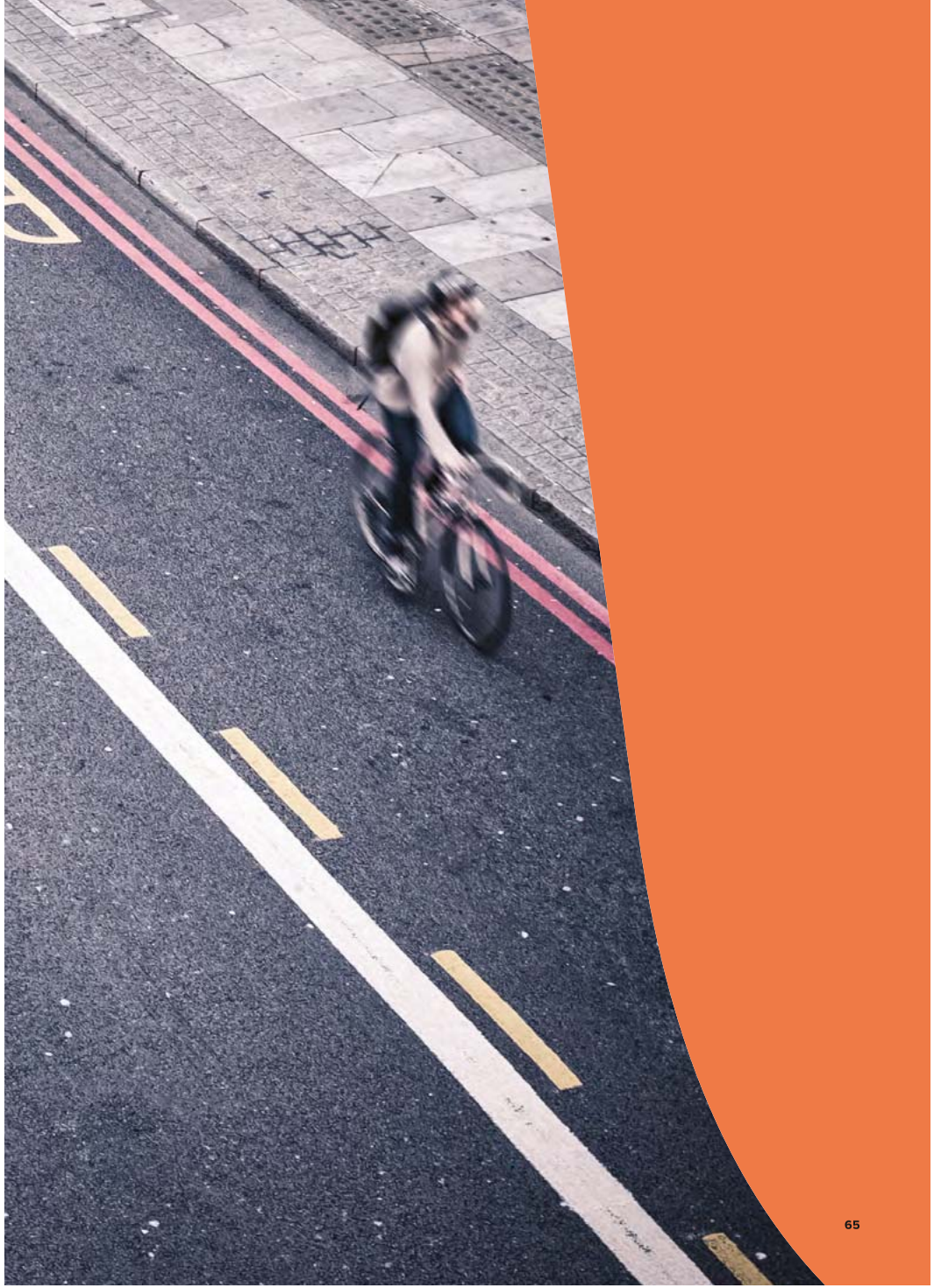
**At the Summer Economic Update the government dedicated £100 million towards Direct Air Capture technologies** – as a type of Greenhouse Gas Removal technologies – in order to help achieve net zero by 2050. In October, the Prime Minister also committed to support the development of floating offshore wind, setting a deployment target of 1GW by 2030.

**The government is also commissioning the NIC to undertake a new study looking at Greenhouse Gas Removal technologies**. This study will report in summer 2021, and the Terms of Reference have been published alongside this Strategy.

# Looking to the future

The government will continue to report reductions in the UK's carbon emissions in line with carbon budgets. The government will also monitor air quality, efforts to reduce the impact of climate change (including drought and flooding), progress against statutory fuel poverty targets, progress against the ambition for two million green jobs by 2030 across the UK, and steps to deliver an average building EPC rating of C. And, as the key pathways towards net zero become more well established, the government will track and use real time data, such as EV uptake and heat pump installation, to ensure the fundamental changes in the economy needed to deliver net zero are being delivered.

**This Strategy is central to the UK's efforts to achieve net zero emissions by 2050 and delivering the Prime Minister's *Ten Point Plan for a Green Industrial Revolution***. By unlocking private sector investment, the government will accelerate the deployment of existing technologies, and advance innovation in new ones. In doing so, the government will lead the UK through a just transition to net zero, that supports the short-term recovery from COVID-19, andlevels up and unites the nations, by providing long-term sustainable jobs in the future net zero economy.



# Supporting private investment

## At a glance

Private investment has delivered major benefits for UK infrastructure and will be vital over the coming decades as the UK moves towards meeting net zero in 2050. The government is committed to supporting private investment and is taking action across the following areas:

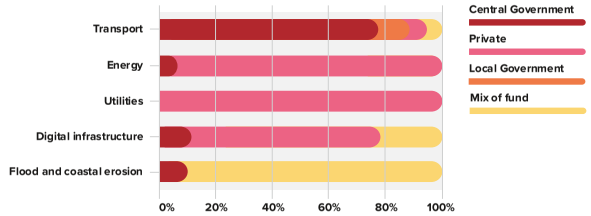
- **The government is setting up a UK infrastructure bank,** to co-invest alongside the private sector in infrastructure projects;
- The bank will operate UK-wide, be based in the north of England, and support the government's ambitions on levelling up and net zero;
- The bank will also be able to lend to local and mayoral authorities for key infrastructure projects, and provide them with advice on developing and financing infrastructure;
- **The government is** committed to the model of independent economic regulation, but will refine it to ensure it provides a clear and enduring framework for investors and businesses and delivers the major investment needed in decades to come, while continuing to deliver fair outcomes for consumers;
- **The government will produce an overarching policy paper on economic regulation in 2021,** which will consider regulator duties, injecting more competition into strategic investments, and the benefits of a cross-sectoral Strategic Policy statement; and
- **The government will** continue to develop new revenue support models and consider how existing models - such as the Regulated Asset Base model and Contracts for Difference - can be applied in new areas and remains open to new ideas from the market. **The government will not reintroduce the private finance initiative model** (PFI/PF2).



**The private sector plays a vital role in achieving the UK's infrastructure ambitions.** Much of UK's economic infrastructure is privately owned, with almost half of the UK's future infrastructure pipeline forecast to be privately financed.[53]

**The UK has long been an attractive destination for private investment,** underpinned by a sophisticated system of independent regulation, strong legal framework and expertise, and leading professional and financial services sectors. This has drawn investment from both UK and international investors across various sectors including transport, digital infrastructure, and utilities.

Funding mix of UK investment between 2018/19 and 2020/21 by sector




Source: 2018 National Infrastructure and Construction Pipeline

**Private investment has delivered major benefits for UK infrastructure**. Over the past decade alone, over £200 billion has been invested in the water and energy sectors.[53]

**Over the past three decades, this investment has delivered significantly higher service quality for consumers.** The number and length of power cuts has more than halved since 2002.[54] From 1990 to 2019, emissions fell 41% while the economy grew 78%,[55] water leaks are down by a third since the mid-1990s[56] and over 96% of premises in the UK have access to superfast broadband (speeds of 24Mbps or more).[57]

**Historic levels of investment will be required in UK infrastructure in the coming years**, to maintain and upgrade networks to meet the government's objectives for economic growth and decarbonisation. For example:

- Water companies in England and Wales will be investing at least £51 billion between 2020 and 2025;[58]
- The total level of investment required to upgrade the nation's broadband networks to be gigabit-capable speeds is in the region of £30 billion; the vast majority of this is expected to come from the private sector;[59]
- Total annual investment in the energy sector was £19 billion in 2019 and this is expected to increase in the years to come in order to transform energy networks to achieve net zero;[60]
- The Prime Minister's '*10 Point Plan for a Green Industrial Revolution*' will mobilise £12 billion of public investment and potentially three times more from the private sector.

The government remains strongly committed to supporting private investment and maintaining the UK's status as a leading global destination for private investment. That is why the government conducted an in-depth review – the '*Infrastructure Finance Review*' (IFR) – of private investment in infrastructure and asked the National Infrastructure Commission (NIC) to undertake a review of UK's system of economic regulation. **This Strategy marks the government's conclusion to the IFR and response to the NIC study.**

The IFR was launched in Spring 2019, and consulted a broad range of financial and infrastructure experts on: the current state of the UK's infrastructure finance market and the role of the European Investment Bank; the ways in which the government and independent regulators can help facilitate investment; the potential future challenges for infrastructure financing; and the performance and possible improvements to the UK's institutional framework to support infrastructure finance. Further information on the IFR is set out in the government's formal response to the consultation, published alongside this strategy.

**The government has heard from the market on the challenges facing UK infrastructure in the coming decades.** The IFR found that the UK continues to have fundamental strengths, and the market appetite for investing in UK infrastructure is strong, especially for long-term investments with well-understood risk profiles. But the UK will face new challenges as it seeks to decarbonise the economy and ensure access to high-quality infrastructure across the country. The government needs to do more to attract private investment to deliver the investment needed in this period.

Following the IFR, the government's approach to private investment is built on three key principles:

- **The government will provide investors with long term policy certainty** including where appropriate, directly coinvesting alongside the private sector and acting as a cornerstone investor on key projects through a national infrastructure bank;
- **The government will maintain a strong and enduring system of independent economic regulation,** helping deliver the investment levels the country needs and fair outcomes for consumers of today and the future; and
- **The government will continue to use a range of policy tools and innovative funding mechanisms to embrace opportunities** from new technologies and decarbonise and level up the economy.

1338

# A new infrastructure bank for the UK

To underpin this infrastructure revolution and catalyse the private investment the UK needs, **the government is setting up a new infrastructure bank for the UK**. The bank will play a leadership role in supporting private infrastructure projects to help meet the government's objectives on economic growth, levelling up, and transitioning to net zero.

**The bank will be headquartered in the north of England,** and will operate UK-wide, supporting investment in projects and programmes across the whole of the UK.

In line with the NIC's recommendation, the new bank will operate within a mandate set by government and have a high degree of operational independence. It will be a world-class, expert institution. The bank will play an important role in supporting new infrastructure technologies.

**The bank will co-invest alongside private sector investors** including banks, institutional investors, sovereign wealth funds, pension funds and global infrastructure investors. It will use a range of tools to support private projects: as well as offering guarantees through the existing UK Guarantees scheme, it will be able to offer debt, equity, and hybrid products.

**The bank will be able to lend to local and mayoral authorities for key regional infrastructure projects.** It will also be able to provide advice and support to these authorities on developing and financing projects.

The new bank will replace some of the activities of the European Investment Bank (EIB), following the UK's departure from the European Union. However, the bank will provide more targeted support than the EIB, and will be better aligned with the UK government's objectives.

**At Budget 2021, the Chancellor will set out comprehensive details regarding the operations, mandate and scale of the bank**. The government intends for the bank to be operational in an interim form, from spring 2021, so it can play a role in supporting the UK's economic recovery from the COVID-19 pandemic. The government will legislate for the bank at the earliest opportunity, to put it on a statutory footing.



# The role of pension funds

**There is a huge opportunity for pension funds to support the UK's infrastructure investment ambitions.** The industry anticipates that pension funds and insurers will be able to invest between £150 billion and £190 billion in infrastructure over the next ten years.[61]

Pension funds invest for the long-term and their objectives and investment profiles are well matched to infrastructure investment, particularly in regulated sectors.

The government wants the National Infrastructure Bank to work closely with pension fund and institutional investor market to explore opportunities for a further expansion of pension fund investment in UK infrastructure.

Already this year the government has made changes to make it easier for pension funds to invest in infrastructure. In March this year the Financial Conduct Authority (FCA) made changes to their 'permitted links' rules to allow unit linked pension funds, which are widely used for contract-based pensions investments, to invest in a wider range of illiquid assets.[62]

Furthermore, the recently published Solvency II Review Call for Evidence seeks views from stakeholders on potential areas in which Solvency II could be reformed to better incentivise insurers, who run contract-based schemes, to invest in infrastructure and other long-term productive assets.

The Department for Work and Pensions are considering a number of changes to remove barriers to infrastructure investment including:

- A consultation on changes to the calculation of the default fund charge cap for automatic enrolment schemes to allow greater flexibility for performance-based fee structures and thereby remove a barrier to investment in longer term assets like infrastructure.
- Changes to allow consolidation of smaller pension funds so they may more easily invest in infrastructure.

# Economic regulation

**The economic regulatory framework is central to the provision of infrastructure**, with Ofcom, Ofgem and Ofwat monitoring and refereeing how infrastructure is funded, delivered and operated within their respective sectors.

**The UK's framework of strong, independent economic regulation has delivered significant benefits in the utilities sectors.** The regulatory model has been integral to attracting over £200 billion of private sector investment in the UK's infrastructure networks and driving higher standards for consumers. The system has also played an important role during the COVID-19 pandemic, helping to ensure that financial assistance has been provided to vulnerable customers and enabling the continuity of vital services.

**The government is committed to maintaining this system of independent economic regulation**. But it is vital the system can rise challenges of the 21st century, notably the need to decarbonise infrastructure across all networks, adapt to climate change, capitalise on new innovative technologies and take advantage of opportunities arising from leaving the EU.

That is why, in 2018, the government asked the NIC to carry out a study on the regulatory model for water, energy and telecoms sectors. The aim of this study was to assess what changes might be necessary to the existing regulatory framework to facilitate future investment needs, promote greater competition and increase innovation, and meet the needs of both current and future consumers.

The NIC published their report – '*Strategic Investment and public confidence*' – in October 2019, setting recommendations for updating the regulatory model to incentivise long term investment and rebuild public confidence. The government thanks the NIC for their work, and at Budget 2020 the Government announced that it **agrees with the NIC's primary finding that the UK's system of economic regulation is working well but needs updating in some areas to address 21st century challenges**.

**The government is committed to taking a long-term approach to investment to provide predictability and the required stability, as well as appropriate incentives to investors. This should also balance the needs of current consumers with those of future consumers**. A detailed response to each of the NIC recommendations on economic regulation is set out in '*Response to the Regulation Study - Strategic investment and public confidence*'. The government's position will be expanded further in an overarching policy statement in 2021.

## Clear strategic direction

The government is mindful of the uncertainties currently faced by investors in a rapidly changing domestic and international context, and recognises the importance of integrity and consistency within the system to help provide certainty to investors and build consumer confidence.

The NIC stressed the importance of a more transparent strategic framework to help regulators support investments, balancing the long-term priorities with the current needs of consumers.

The government uses strategic policy statements as a formal mechanism to set long-term priorities for the regulated sectors, such as those already issued for Ofwat and Ofcom.

At Budget 2018 HM Treasury and the Department for Business, Energy and Industrial Strategy (BEIS) launched a review of strategic policy statements, concluding in 2019. The government considers that strategic statements have been successful in setting long-term priorities, but also recognises the benefits of having an additional overarching set of strategic priorities to complement and bring focus to sectoral specific strategic policy statements and reflect common challenges faced by regulators, such as data sharing and protection, as well as broader investment priorities such as the net zero and levelling up agendas.

**The government supports the NIC's recommendation to create a more transparent strategic framework and commits to producing an overarching policy paper in 2021**. This will set out further details on key areas, including commitments to consider regulator duties, inject more competition into strategic investments, and explore the benefits of cross-sectoral strategic policy statements in order to provide greater clarity for regulators, investors and consumers.

## Coherent duties to reflect new challenges

Regulators currently have a number of additional duties, beyond their primary duties, which they must consider in carrying out their core functions. For instance, Ofwat has a duty to contribute to the achievement of sustainable development, whilst Ofcom has a duty to consider innovation.

While existing duties vary between regulators, and further consideration should be given to how these are prioritised, the government supports the adoption of a coherent approach to price, quality, resilience and environment in order to meet 21st century challenges and promote innovation and growth. In particular, the government supports the NIC's recommendation that, where relevant, regulators should have duties to support net zero targets. **The government will continue to review the most appropriate measures, including a net zero duty, to ensure that regulators make the necessary contributions to achieve these targets.**

The government also recognises the opportunity for greater collaboration between regulators approaching similar challenges, building on the work of recent years. **The government supports the NIC's recommendation for the UK Regulators Network to have a stronger role, and commits to increasing collaboration, including by reviewing data sharing powers between regulators, with a view to considering how best to encourage regulators to develop joint data sets for 'whole customer' analysis.**

## Greater use of competition

To ensure that new infrastructure is delivered in the most efficient and appropriate way, the government supports the NIC's assessment that the use of competition should be harnessed as the most reliable means of supporting innovation and providing enhancements to economic infrastructure.

Competition in investment is already used successfully in economic infrastructure to drive transformational change. For example, competition has driven rapid innovation in mobile networks, seeing mobile data per connection being over six times higher than five years ago. The government will outline plans on electricity onshore networks, including introducing competition, in the forthcoming *Energy White Paper*. The government will also review whether regulators need further powers to promote competition as part of the forthcoming policy paper.

## Building public confidence

**The government recognises the importance of building public confidence in companies, regulators and investors, to the long-term success of utility provision.**

This includes ensuring companies take the needs of the communities they serve into account. To this end, the regulatory framework should be updated to reflect the government's priorities for levelling up and devolution of powers within the UK. **The government agrees with the NIC's proposals for regulators to ensure that devolved administrations, local authorities and metro mayors have sufficient opportunity to contribute to consultations as part of the price control process**.

The government also agrees with the NIC that regulators should be proactive in ensuring that rewards for investors reflect performance. Above all, customers must be confident that companies are well run and governed. Regulators need to deliver this confidence whilst also enabling sectors to be adequately financed so they may perform well for present and future generations. Regulators currently have a range of powers and tools to ensure that the rewards for investors reflect performance, and the government supports their role in driving improvements in this area.

Overall, as the NIC's report demonstrates, updating the UK's regulatory model to further long-term investment and build public confidence will be a vital task over the next few years. These efforts take on even greater significance in the context of the COVID-19 pandemic, where an effective and updated system of independent economic regulation will be crucial to efforts to build back better.



# Funding support mechanisms

The UK has a long history of harnessing the innovation and capacity of the private sector to help deliver infrastructure. Meeting the challenge of net zero will require a host of new technologies and a partnership in different forms between the private sector and government to pull them through into commercialisation.

The government has already developed a range of tools to attract investment and will continue to apply these in new areas and develop further innovative models to meet specific challenges. This includes setting revenues and prices on a competitive basis, for example through Contracts for Difference (CfD) in renewable energy; subsidising delivery in uncommercial areas like gigabit broadband rollout; or bespoke mechanisms for new investments such as the Regulated Asset Base (RAB) model for Thames Tideway Tunnel.

The government continues to consider new models and how existing models can be applied in new areas and is open to ideas from the market. Examples include:

- **New support mechanisms:** In 2019, the government consulted on using the RAB model for new nuclear power stations and other energy sources. It has also published a response on business models for carbon capture, and storage (CCS), where it is developing new support mechanisms and markets for industrial emissions technologies, hydrogen production and power plants with CCS technology in order to create innovative solutions to a complex set of incentives. These business models will require careful design to ensure new markets can be established and private investment can be sustained;
- **Opening up existing mechanisms to new areas:** In March 2020, the Government announced that onshore wind and solar PV would be included in the next round of CfD auctions. Since 2009, awarding the ownership and operation of offshore wind network connections through a competitive tender process is estimated to have saved consumers in excess of £700 million.[63] The government will outline onshore network in the forthcoming *Energy White Paper*, including plans to legislate to introduce competition; and
- **Incubating new ideas:** Since 2016, the Government has made the largest increases to public support for research and development (R&D) on record. This investment will support a range of sectors including new opportunities and emerging technologies for infrastructure, construction and manufacture, for example digital manufacturing, robotics and modular methods of construction.

In 2018, the government retired PFI/PF2 for new schemes because of their fiscal risk, inflexibility and complexity. As part of the IFR, alternatives to the PFI and PF2 model were explored and assessed against the government's test for any new private finance model: its benefits must outweigh the additional costs of private finance. No new models were found through this process, and so **the government** will not reintroduce PFI, PF2 or similar models of private finance.

The government still makes payments of nearly £10 billion a year on existing PFI, PF2 and other associated contracts which were entered into by previous administrations. **The government is funding a programme of work to review PFI contracts, to ensure they are well managed.** This includes providing support for authorities taking back PFI assets as contracts expire and delivering extensive contract management training across the public sector.

# Accelerating and improving delivery

## At a glance

The government wants to deliver infrastructure projects better, greener and faster. That means addressing longstanding challenges such as complex planning processes, slow decision-making, and low productivity in the construction sector. It also means learning lessons from the COVID-19 pandemic, for instance from the approaches that built Nightingale Hospitals in record time, and saw the UK move swiftly to secure access to a range of promising vaccines. Further, there is a clear opportunity with EU exit to change how this government delivers projects, using the flexibility the UK has as a sovereign country to do things differently.

The government set up Project Speed in the summer, to review every part of the infrastructure project life cycle and identify where improvements could be made. Project Speed has developed a comprehensive package of reforms, including:

- **Reform of environmental regulations** to deliver a quicker and simpler framework for assessing environmental impacts and secure better outcomes for the environment;
- **Landmark reform of the planning system including** consulting on amending permitted development rights, to let schools and hospitals be expanded quickly;
- **Transforming the construction sector** to enable it to become more productive, more sustainable and more internationally competitive, with better use of data and modern methods of construction;
- **Ensuring more effective decision making** with streamlined approval processes, more emphasis on quality design, and better monitoring and evaluation;
- **Embedding good design in all infrastructure projects through** planning reforms; and
- **Bringing about a step change in capability and leadership,** accelerating investment in major project expertise and delivery skills and improving the skills base across the country to ensure every area can deliver the infrastructure it needs.

These reforms have already driven substantial progress, and in future mean the UK's vital infrastructure like schools, hospitals, transport and other networks will be delivered better, greener and faster:

- **Better**, because the process of assessing infrastructure projects under the revised methodology will ensure the government is valuing the wider economic, social and environmental benefits of a project. The government will set projects up to succeed by strengthening the assurance and decision-making regime;
- **Greener**, because the requirements of the net zero commitment will be embedded in every stage of the project life cycle and underpin decisions on the technical solutions chosen to achieve the required outcomes; and
- **Faster**, by simplifying and shortening the processes through which projects secure the consents they need to proceed, procure contracts and deliver; while using modern methods of construction, new skills and a strategic relationship with industry which will improve productivity.

**The effective delivery of infrastructure is critical to the success of this Strategy**. The government and industry must work together in new ways to accelerate the delivery of the government's ambitious infrastructure portfolio, whilst delivering better environmental and biodiversity outcomes in line with the UK's 25 year Environmental Plan.



The UK has proved that it can deliver safe, world-class and innovative infrastructure, such as the A14 upgrade which was delivered eight months early and on budget using innovative procurement and construction methods. However, the project took years to enter construction, and illustrates the well-known and longstanding challenges that government and industry face. The end-to-end delivery process is complex and takes a long time, with some of the most critical projects taking over a decade to move from conception to reality.

Government decision making can be slow and duplicative, as can planning and development regimes. Productivity growth in the UK construction sector remains one of the lowest of all sectors of the economy, in part because the industry has lacked the confidence to invest in innovation and developing capability. The government has too few project delivery professionals equipped with the right skills, and projects are often not set up and managed well enough to anticipate and prevent delays and cost increases.

The COVID-19 pandemic has shown that this does not need to be the case. The government has assembled Nightingale hospitals in lightning quick time. Through the ventilator challenge, government and industry worked together to design, build and procure ventilators at record time and scale. It is time to take these learnings and apply them to infrastructure.

Combined with EU exit, **this provides opportunities to build back better by designing planning and procurement regimes that are tailored to the UK, putting outcomes ahead of process whilst protecting the environment and the nation's biodiversity**. It will also allow the UK to prioritise its own interests when procuring and working with industry, ensuring money spent on infrastructure projects delivers transformational economic, social and environmental outcomes for citizens.

**The Prime Minister launched the Project Speed taskforce in summer 2020, which aims to accelerate and improve the delivery of the government's infrastructure portfolio**. Project Speed has reviewed the end-to-end delivery process working closely with experts - applying learnings across a number of case study projects to test and iterate a comprehensive package of reforms. On some of these projects, the taskforce has already found potentially significant time savings through more efficient and focused decision making, and will be accelerated further over the course of this Parliament.

Chapter five

# A66

The A66 is a critical freight and regional transport route, connecting the North East and North West. This major upgrade programme will dual the six remaining sections of single carriageway between Scotch Corner and Penrith.

The project was programmed to take over fifteen years, including four more years of development and ten years of construction.

The Project Speed review identified ways to save up to 50% of time in the planned construction process, cutting this down from 10 to 5 years through innovative solutions such as standardised, modular and offsite design and construction, alongside more intensive and concurrent delivery.

In aggregate, these interventions could accelerate delivery by around one third, enabling users to benefit from the improved road over five years earlier. Through reviewing the end-to-end delivery schedule of the A66, Project Speed was able to identify, test and iterate reform options to the decision making, planning and construction processes. These reforms will now be rolled out across the government's portfolio, dramatically cutting delivery times and providing benefits to users earlier.

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# Reforming planning and environmental regulations

The planning system governs the regulation of land use and development. It is central to addressing the UK's infrastructure priorities, unlocking land to deliver new infrastructure whilst ensuring citizens are empowered to shape their local communities and achieving the best environmental outcomes.

Part of the current planning system can be complex and burdensome, slowing project development and adding costs to construction. They need to be refreshed to address 21st century challenges, as the UK builds back better, greener and faster.

Combined with EU exit, this is a historic opportunity to design more nimble frameworks that speed up the delivery of critical infrastructure while protecting and enhancing England's unique ecosystems. Reforming the planning system is not a task this government undertakes lightly, but it is both an overdue and a necessary reform.

**Project Speed represents a revolution in the government's approach to delivering infrastructure projects better, greener, and faster.** Embedding these reforms will require strong drive from government, legislative reform and strengthening working relationships with industry.

This package of reforms cuts across four areas:

- **Reforming infrastructure planning and better environmental regulations:** accelerating planning permission by removing blockers and inefficiencies in current planning regimes, allowing more dynamic project development whilst ensuring better environmental outcomes after EU exit;
- **Simplifying procurement regulations and modernising the construction sector:** designing more streamlined procurement regulations after EU exit, enabling government to use its weight as a customer to support the construction industry in adopting modern, highly productive practices;
- **More effective decision making:** front-loading decision making – stopping or progressing schemes earlier; streamlining and condensing governance, with assurance and approval milestones planned upfront and bringing in functional expertise earlier; and monitoring and evaluating projects using better data to support continuous improvement and policy reform; and
- **A step change in capability and leadership:** accelerating investment in major project expertise and delivery skills; and recruiting expert leadership and improving the skills base across the country to ensure every area can deliver the infrastructure it needs.

This is a major reform package and the prize is substantial - in aggregate, these reforms could

## Planning regime for infrastructure

Whilst planning for the UK's largest schemes such as HS2 might require an Act of Parliament, or a special consent under the Transport and Works Act, the majority of infrastructure projects that require consents will use one of two main routes. The Town and Country Planning Act 1947 (TCPA), supported by the National Planning Policy Framework, allows local authorities to make planning decisions for development and infrastructure within their local areas. The Nationally Significant Infrastructure Projects (NSIP) regime is used for projects such as large strategic road schemes and power stations. The NSIP regime is well-respected but is currently not being implemented as effectively as possible, leading to slower delivery times and more uncertainty.

**In August 2020, the government published its** *Planning for the Future*, which closed for consultation on 29 October 2020, proposing a wide range of reforms to bring England's planning system under the TCPA into the 21st century.[64] The reforms seek to support the redevelopment of town and city centres for housing and local infrastructure through a simpler and more certain system and unlock the growth potential of areas across the country.

In addition to these reforms, **the government is making it easier and faster to build social infrastructure**, responding to the needs of local communities, such as for schools and hospitals, by consulting on:

- **Amending Permitted Development Rights (PDRs)** through secondary legislation, which will allow for the easier expansion of schools, hospitals and prisons. PDRs accelerate specified types of development through the planning system by allowing development to take place without requiring full planning permission from the local planning authority. This change will enable the extension of the footprint of facilities by 25% or 250 square metres, whichever is larger; and
- **Introducing a faster planning application process** for more substantial school, further education college, hospital and prison developments, through secondary legislation to encourage greater prioritisation of applications by local planning authorities, including a shorter timescale of 10 weeks for determination.

# School Rebuilding Programme

The School Rebuilding Programme commits to a 10-year pipeline of 50 schools a year. This long-term pipeline will enable industry to invest in itself, building the capacity to deliver high quality, greener buildings that support the government's 2050 net zero target faster through application of modern methods of construction.

The proposed planning reforms in this Strategy will help to increase the use of permitted development rights to replace buildings on existing school sites, where the development is not on playing field land and does not exceed six metres in height. Many schemes are expected to be eligible for the enhanced PDR, potentially taking months off the planning permissions process for each of those projects.

Major energy, transport, water, waste and commercial projects are consented through the NSIP regime. The regime has a strong track record for delivering robust consents. However, Project Speed has identified risks to the timeliness of ministerial decision making, inefficiencies in the ways in which different public bodies interact with the regime, and scope for improvement including through adoption of digital working practices. Therefore, **the government is establishing a National Infrastructure Planning Reform Programme** to refresh how the NSIP regime operates, making it more effective and bringing government departments together to deliver more certainty in the process and better and faster outcomes. This will:

- Set an ambition to cut timescales by up to 50% for some projects entering the system from September 2023;
- Establish a project "acceleration team" of planning experts to accelerate infrastructure projects through the system, identifying innovative ways to deliver faster planning consents; and
- Monitor the performance of the NSIP regime, coordinate with relevant departments on the need for a review of their National Policy Statements and ensure effective engagement with infrastructure departments, statutory consultees and the Planning Inspectorate and industry.

## Environmental regulations

**Delivering vital infrastructure whilst protecting and improving the environment is a top government priority.** EU exit provides a historic opportunity to design a quicker, simpler framework for assessing environmental impacts and enhancement opportunities, that speeds up the process while protecting and enhancing England's unique ecosystems. This new system for environmental assessment will be tailored to the country's needs, outcomes rather than process-focused, respectful of local democratic processes, and support net gains for biodiversity wherever possible. These reforms include:

- **A new system of environmental assessment (including Strategic Environmental Assessments and Environmental Impacts Assessments)** – to deliver a new framework that provides clarity, removes duplication, and ensures environmental considerations are embedded effectively in decision making at an early stage; and
- **Strategic approaches to the protection of habitats and species,** allowing more dynamic and pragmatic planning, including placing schemes like district level licensing on a statutory footing and developing strategic habitat mitigation and compensation schemes like the Solent nitrate trading platform.[65] This will help unlock development and reduce delays now, while respecting and improving the environment, without requiring wider reforms of the planning system to be in place.

## Designing high-performing and beautiful infrastructure

The government wants the planning process to stimulate proposals that are well-designed and will enhance the environment, health and character of local areas. As outlined in *Planning for the Future*, the government wants to better incentivise good design and high-quality homes and infrastructure, which should be a central tenet of the planning system and planning decisions.

**Good design is also an essential element in securing high performance of infrastructure from the start**. In line with the design principles set out by the National Infrastructure Commission (NIC), **the government is committed to embedding good design in all infrastructure projects through:**

- Local plans which set clear rules rather than general policies for development, so that quality cannot be negotiated away nor can the lived experience of the consumer be ignored too readily;
- A reformed planning system which brings forward a new focus on design and sustainability in national policy and practice, building on the *National Design Guide* published in October last year, with a consultation on the proposed *National Model Design Code* later in 2020; and
- Requiring all infrastructure projects to have a board level design champion in place by the end of 2021 at either the project, programme or organisational level, supported where appropriate by design panels.

# Simplifying procurement and modernising construction

Up to £37 billion of contracts across economic and social infrastructure will be brought to market over the next year.[66] But current procurement regulations are burdensome, slow and do not do enough to ensure public money delivers high-quality, innovative outcomes.

The COVID-19 pandemic has required a step change in the scale of public procurement, whether it be designing and manufacturing ventilators or building Nightingale hospitals in record time. Combined with EU exit, this is a historic opportunity to improve the UK's regulatory model, building on the lessons from COVID-19 and ensuring greater transparency, fair and open competition. **With a more effective procurement regime in place, government can use its weight as a major buyer to modernise the construction industry and drive better outcomes across the country.**

## A simplified procurement regime

Exiting the EU provides the opportunity to streamline regulations, reduce waste and create a simpler, fairer, more flexible and innovative regime for public procurers and for suppliers to government. The government will publish a green paper in due course which will propose radical reform of the procurement rules. These reforms include:

- **Reducing and simplifying the current procurement procedures** which cause unnecessary bureaucracy and confusion for suppliers;
- **Embedding transparency** by default throughout the commercial life cycle so that procurement and contract data can be more easily scrutinised; and
- **Improving the way commercial tools operate,** such as framework agreements, to improve open competition and avoid a situation where potential suppliers are locked out of government business; and
- **Improving the way in which procurement challenges operate** to reduce costs for both the public and private sectors, deterring spurious challenges whilst ensuring that genuine grievances are dealt with efficiently.

With a simpler, fairer and more effective regime in place, the government can use public procurement to drive better economic outcomes across the country – including supporting a more productive, modern construction industry.

## Transforming the construction sector

Currently, the UK's construction industry is not living up to its full potential. It contributed £117 billion to the UK economy in 2018 and supports over two million jobs, but is one of the nation's least productive industries, and the built environment is a major contributor to greenhouse gas emissions.[67 68]

The government can use its weight as a major construction client to transform and modernise the industry. The publication of The *Construction Playbook* in winter 2020 will improve how government assesses procures and delivers public works. The *Construction Playbook* will set out policies and principles developed with the private sector and drawing on best practice across the public sector. A multi-year implementation programme will embed The *Construction Playbook* to:

- **Incentivise industry to innovate** by setting clear and appropriate outcome-based contract specifications, rather than defining upfront how infrastructure should be delivered;
- **Support industry to invest in itself** by providing greater certainty of demand with longer term contracting across portfolios. This includes continuing to publish a comprehensive National Infrastructure and Construction Pipeline with the next update in Spring 2021;
- **Facilitate the adoption of Modern Methods of Construction (MMC),** off-site manufacturing by standardising components, designs and interfaces;
- **Further embed digital technologies** to standardise the approach to generating and classifying data, data security and data exchange, and to support the adoption of the Information Management Framework and the creation of the National Digital Twin; and
- **Develop a consistent and mutually beneficial relationship with industry** to move away from a confrontational approach, towards stronger relationship and contract management which will deliver continuous improvement over time.

The Infrastructure and Projects Authority (IPA) will publish *Transforming Infrastructure Performance 2021* next year, providing more detail to industry and partners on the government's shared vision for the future of infrastructure and the roadmap for delivering it, building upon the measures outlined in this Strategy and the *Construction Playbook*.



# Health Infrastructure Plan

The Health Infrastructure Plan sets out the Department of Health and Social Care's strategy for investment in NHS Infrastructure, and was taken further in the manifesto commitment to have 40 hospitals built by 2030. Application of the Construction Playbook principles, including a pipeline approach and commercial and procurement strategy which generates market appetite, will incentivise performance improvements over the life of the programme. This will involve the application of MMC and new technologies to facilitate, drive and enable the delivery of this investment in capital infrastructure within the challenging timeframe.

**Building a stronger, more diverse and sustainable construction industry will require long-term investment in skills** to increase recruitment, improve retention rates and support the industry to adopt new technologies and techniques – particularly in green and digital construction. The government has recognised the importance of investing in skills and training as part of its economic response to COVID-19, and the Prime Minister recently set out his commitment to skills and lifelong learning. Government is taking forward reforms to:

- **Support industry through sustained public investment,** by bringing forward £8.6 billion of decarbonisation, infrastructure and maintenance projects in the summer, and by increasing capital spending next year;
- **Leverage public contracts to boost opportunities** for construction apprentices, traineeships and T levels in the construction sector, and to recruit a more diverse workforce;
- **Improve apprenticeships for employers** across the economy, which the construction industry will especially benefit from, allowing them to transfer more of their unspent levy funds before they expire and use more intensive apprenticeships training options;
- **Introduce construction sector traineeships** to bridge the gap between further education courses and entry to employment; and
- **Allocate funding for adult learners** to access short training modules (4-16 weeks) for upskilling and reskilling via the National Skills Fund investment.

# More effective decision making

The government has a long-standing and robust decision-making process in place, supported by the frameworks of the *Green Book* and *Managing Public Money* guidance, HM Treasury and Cabinet Office approvals processes, and internal departmental investment committees. The UK is a world leader in its frameworks for decision making, and models such as the Green Book are followed by many other countries.

However, UK decision making could be faster and more effective. Low investment in regional infrastructure projects has left some parts of the UK behind, and decisions do not always fully capture the government's priority outcomes. Decision making is not always driven by the best data and the process can often be slow and duplicative. Finally, projects don't focus enough on monitoring and evaluation processes that would identify best practice for future decision making.

## Reflecting priority outcomes

If the government is to deliver on its ambitions to level up and decarbonise the economy, decision making will need to be more focused on supporting the government's priority outcomes. This means that, for example, projects which significantly reduce regional disparities and carbon emissions should be given greater consideration. **The government is taking forward work in a number of areas to ensure that decision making reflects priority outcomes,** including:

- **The 2020 Spending Review has already started the process,** introducing the new Public Value Framework which establishes a clear link between departments' spending proposals and intended outcomes, thereby supporting the selection of the most effective and impactful projects;
- **The government has launched the trial of a new Project Scorecard** to identify from the outset how projects will contribute to government's priority outcomes. This will give decision-makers better information about the extent to which different investment options deliver their objectives; and
- **The government has also published an updated *Green Book*** following a comprehensive review process. This seeks to rebalance an appraisal process that has frequently relied too heavily on the benefit-cost ratio, to the exclusion of the development of a robust and well-evidenced strategic case. It will also introduce new guidance on analysing place-based and transformational impacts. Together this will support and enable the levelling up agenda.

## Better use of data

Good decision making is underpinned by clear and accessible data – both on the nature of the problems that infrastructure is trying to solve, and on the performance of existing infrastructure systems. The NIC's 2018 study *Data for the Public Good* identified that there is currently limited understanding of how the UK's infrastructure works as a system and that use of new technology like sensors, digitalisation, digital twins, the internet of things, big data, and artificial intelligence is piecemeal and not done in a coordinated way. The government will address this by:

- **Launching a new cost benchmarking hub and data platform,** supported by cost estimating best practice guidance to ensure project assumptions are realistic and achievable at the outset, enabling more robust decisions at an earlier stage;
- **Developing a "national digital twin" of the UK's infrastructure systems and built environment.** Smart infrastructure is capable of collecting data about itself as it operates, which can then be used to inform real-world decisions. This is known as a "digital twin". Although many infrastructure owners across energy, waste, transport and water have "digital twins" of their assets, the exchange of data between these systems is often ineffective, making it harder to tackle cross-cutting infrastructure issues such as climate change; and
- **Developing a National Underground Assets Register.** The UK does not have an efficient process for utility asset owners to share their data. This means in order to plan or carry out infrastructure works, planners and excavators must contact all asset-owning organisations in the area, wait for each to respond, then compile information so it can be read and understood by workers. This process is slow, inefficient and limits the speed at which works can be carried out; a comprehensive register of underground assets would help address this. It will also help prevent accidental damage to underground pipes and cables which currently costs the UK economy £1.2 billion per annum and will improve worker safety.[69]

## Streamlining processes

The government can further improve the quality and the speed of those decisions, making them well and only once, rather than regularly re-opening and prolonging the process. Project Speed has developed the following reforms to do this:

- **Streamlining and condensing governance** – seeking to remove duplication and speeding up investment approvals at the centre of government by combining HM Treasury and Cabinet Office approvals processes for priority projects;
- **Bringing in specialists and ministers into the process earlier** – to offer expertise, support and provide key decisions early on - progressing or stopping projects at the right time; and
- **Front-end loading planning and decision making** – ensuring all major projects that are complex or novel use the Routemap methodology, a project initiation tool developed by industry and the IPA. A new Project Delivery Framework will be introduced in early 2021, including setting clear standards that must be met at each stage for a project to proceed.

## Monitoring and evaluation

**Good decision making does not stop with project approval.** To ensure the UK is getting the maximum value out of reforms and taxpayer money, the government needs to robustly monitor and evaluate projects during and after delivery. Changes to how the government monitors and evaluates project outcomes will improve how institutions like the NIC and National Audit Office (NAO) hold the government to account.

At the heart of the government's monitoring and evaluation framework is the IPA's oversight of the Government Major Projects Portfolio (GMPP). This ensures robust oversight of government's most complex and strategically significant projects and programmes. **The government is taking action by updating the GMPP to ensure the most critical and complex projects receive robust scrutiny and oversight.** The portfolio has recently been updated, increasing in size by 50% to reflect the full range of major projects delivering government priorities. Further, from April 2021 government departments will be required to collect and report improved project performance data including on; productivity, sustainability, levelling up and innovation to the IPA.

**From April 2021, all major infrastructure projects on the GMPP will be required to publish a summary business case following final approval, a close out report following completion and a long-term evaluation five to ten years into operation.** Over time this will create an evidence base to support continuous improvement and further policy reform.

# A step change in capability and leadership

Strong and accountable leadership is vital to the success of the government's infrastructure agenda and essential for successful delivery across every stage of the infrastructure lifecycle. The government is already investing in building the capability of its leaders through the Major Projects Leadership Academy and associated programmes.

**But to build better, greener and faster, the government needs to drive a step change in capability, culture and behaviour.** The government needs to equip those accountable for the success of projects – Senior Responsible Owners (SROs), Accounting Officers and Ministers – with the skills and tools they need, and ensure clear accountability, both for project delivery and successful outcomes.

The government is accelerating investment in major project expertise and leadership skills by:

- **Recruiting a pool of major projects experts,** deployed directly into departments, to boost leadership capacity and capability in government major projects, and filling critical gaps in professional delivery roles across the government's major project portfolio;
- **Creating a better deal for major project SROs** to boost capability and capacity across government, by taking forward work to reform selection, remuneration arrangements, grade structures and support, which will attract and retain top talent; and
- **Setting a requirement for projects to demonstrate SRO capability and capacity** through approvals gates, to ensure projects are resourced with leaders with the right level of experience and time to focus on effective delivery.

To complement these reforms, the government is putting in place a new rigorous approach to standards and professional accreditation to build a sustainable skills base by:

- **Establishing a new Government Projects Academy** to set professional standards and equip people across government with the expert skills needed to deliver major projects successfully, putting world class delivery, modern methods and sustainable practices at the heart of training practices. This would be open to project leaders from across the public sector and local government including **making new scholarships available to project leaders in local government;**

- **Introducing a rigorous new approach to developing and accrediting project professionals at all levels,** from foundation to mastery, starting in 2021, with standards set by the new Government Projects Academcy; and
- **Establishing training on major project delivery as a core expectation for Ministers and senior officials** as senior sponsors of infrastructure projects, to build understanding of how best to support and challenge major projects to help them succeed.

# Looking to the future

This package of reforms will revolutionise the way government operates and transform the way infrastructure projects are delivered, leading to a step-change in delivery speed and quality.

**Project Speed has been an effective tool for galvanising Whitehall and industry, challenging the status quo and driving change**. However, the job is not yet complete. The taskforce will continue to remove obstacles in the process of delivering infrastructure, challenge assumptions, and develop, test and iterate reforms on case study projects. The reforms will be rolled out across the breadth of the government's infrastructure portfolio through the settlements agreed at Spending Review 2020 and future events.

**The government will remain committed to effective infrastructure delivery, implementing reforms at pace, removing barriers to delivery and continuing to test current assumptions**. This will ensure that the government's ambitious infrastructure pipeline is delivered better, greener and faster.

Chapter six

# Conclusion and next steps

This Strategy sets out the government's plans to transform its approach to infrastructure policy and delivery, to meet both the short- and long-term challenges facing the UK. This Strategy:

- **Provides a long-term perspective without ignoring shorter-term imperatives:** the Strategy puts recent spending announcements in context, emphasises the value of infrastructure investment to support the economic recovery, but also looks beyond the Spending Review to the government's longer-term ambitions.
- **Sets out clear goals and plans to achieve them:** the government has set out clear ambitions across all economic infrastructure sectors, focused on recovery, levelling up and decarbonisation. These ambitions are underpinned by clear actions, with more detail to come in some areas over the coming weeks and months, with more detail to come in some areas over the coming weeks and months.
- **Announces, multi-year funding commitments for key infrastructure programmes** to back up its ambitions, with more details to come at the next Spending Review in 2021. It makes clear that where policy is devolved, the devolved administrations benefit from funding, through the Barnett formula, enabling their investment to support people and business in Scotland, Wales and Northern Ireland. The Strategy also sets out the government's plans to review the National Infrastructure Commission's (NIC's) fiscal remit.
- **Confirms the government's commitment to fundamentally change the way it considers and delivers infrastructure** across the whole of the UK. It matches the spirit and ambition of the NIC's *National Infrastructure Assessment*, in many places exceeding their recommendations.



However, this Strategy isn't the final word on the government's infrastructure plans – it instead represents the first step of a multi-year process to transform the UK's infrastructure networks. The ambitions set out here will be further strengthened by the next Spending Review in 2021. This Strategy will also be enhanced by a series of related publications over the next 12 months, setting out further details on key areas of infrastructure policy, including:

**In the next three months:**

- The *Union Connectivity Review*
- The *Construction Playbook*
- The *Integrated Rail Plan*
- The *Energy White Paper*

**In the next six months:**

- The *Net Zero Review* final report
- The *National Infrastructure and Construction Pipeline*
- *Transforming Infrastructure Performance: 2021*
- A transport decarbonisation plan

**In the next twelve months:**

- The *English Devolution and Local Recovery White Paper*
- An electric vehicle charging infrastructure strategy
- A heat and buildings strategy
- A hydrogen strategy
- An industrial decarbonisation strategy
- A refreshed *Industrial Strategy*

Taken together, these documents will set out the full scope and scale of the government's ambitions to level up and unite the country, decarbonise the economy, and revolutionise how the UK funds and delivers infrastructure.

**Inclusive infrastructure**

Much of the UK's infrastructure was built at a time when the needs of disabled people were not sufficiently prioritised. The consequence has been decades of retrofitted solutions – often expensive, unattractive, and achieving only 'accessibility'. It is vital that the UK's future infrastructure is fully inclusive of everyone, including Britain's 14.1 million disabled people.

The government is determined to transform the lives of disabled people, who for far too long have encountered barriers to enjoying the day to day activities and opportunities that others can take for granted. Infrastructure is a key part of this, and in **Spring 2021 the government will publish a** *National Strategy for Disabled People*, expanding on the ways that the government will pursue inclusion and extend opportunities for disabled people across all aspects of life.

# The future of the National Infrastructure Commission

The NIC's exceptional analysis underpins many of the measures announced in this Strategy, and their National Infrastructure Assessment has influenced government decision making since its publication in 2018.

Looking forward, the NIC will now begin preparations for the second 'National Infrastructure Assessment' due for publication in 2023. This new, comprehensive review of the UK's evolving infrastructure priorities will have to take the ambitions and plans set out in this Strategy into account. It will also have to assess the longer-term impact of COVID-19 on economic infrastructure sectors, including any behaviour and technological changes catalysed by the pandemic.

In the meantime, the government has identified new priorities for the NIC for 2021, and is commissioning a new study on greenhouse gas removal technologies which will report next summer. The NIC will provide recommendations to government on:

- the technologies that should be deployed to deliver negative emissions;
- the policies needed to incentivise the rollout of these technologies; and
- the timeline of decisions needed by government to enable the UK to use negative emission technologies to achieve net zero.

The term of reference for this work have been published alongside this Strategy.

The government is also committed to ensuring the NIC maintains its reputation as an impartial, expert body. Building on the new and re-appointments announced earlier this year,[70] the government will shortly launch a competition to appoint several additional Commissioners. This will help strengthen the NIC's expertise in key areas – including local government and environmental issues – and increase the diversity of the Commission.

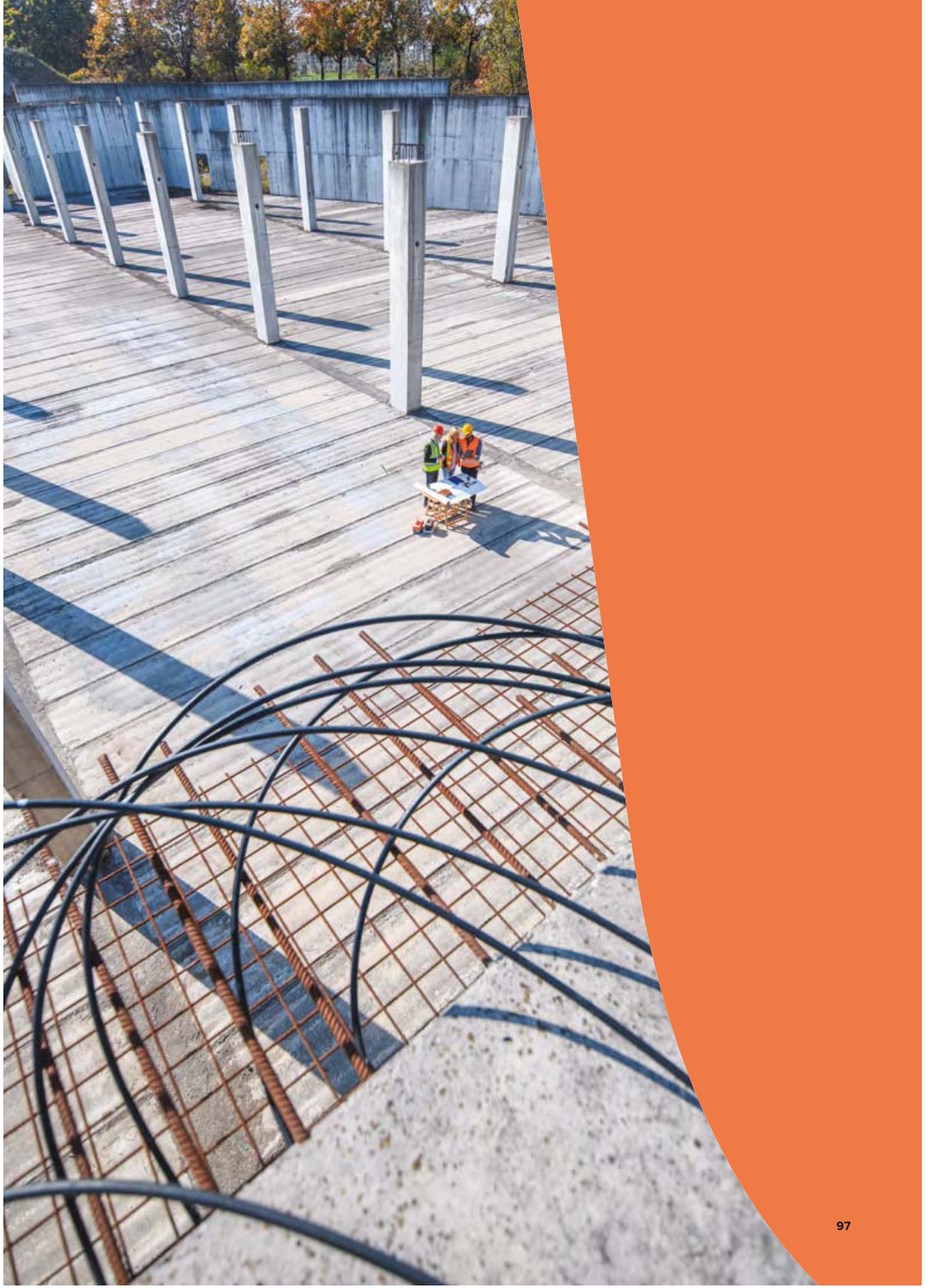
The government will also review the NIC's role and responsibilities in 2021, including updating their Charter and Framework documents if necessary, to ensure the Commission can continue to shape and support this government's infrastructure ambitions. This work will be carried out alongside a review of the NIC's fiscal remit.

## Responding to NIC studies

Since the National Infrastructure Assessment was published in 2018, the NIC has also produced three separate studies: on freight, economic regulation and resilience. The response to the NIC's regulation recommendations has been provided in 'Government response to NIC regulation study – Strategic investment and public confidence.' The Department for Transport will also provide a formal response to the Freight Study in 2021.

The NIC resilience report, 'Anticipate, React, Recover: Resilient infrastructure systems', published in May 2020, proposes a new framework for resilience and makes a series of recommendations to government to help ensure infrastructure operators can deliver and maintain truly resilient infrastructure. The current public health situation has shown that unpredictable 'black swan' events can and do happen, and that preparedness for these shocks is vital.

In light of COVID-19, and given the ever-present threat of climate change, there is a stronger case to talk about resilience of infrastructure – both in the context of the current pandemic and also the increasing risks from climate change and other threats. The government will therefore respond in full to the NIC report in early 2021.



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**Appendix CL2.23**

**Vale of White Horse District Council Climate Action Plan 2022-2024**

# Climate Action Plan

for Vale of White Horse District Council

## 2022-2024

Vale of White Horse District Council

# Foreword

We are really proud to present our Climate Action Plan for 2022-2024. Tackling the climate emergency is a priority for us and this Plan sets out how we will achieve our target of becoming carbon neutral by 2030, with a 75 per cent reduction in emissions by 2025. Actions in the Plan focus on how carbon emissions will be reduced from our services and ways of working by embedding climate considerations throughout, how we will provide our staff with training and skills to integrate carbon reduction in their work, how we will manage our buildings and land by using sustainable best practices, and how important it is to work with our partners and communities to tackle the climate emergency across our district to strengthen our impact.

Our Climate Action Plan is a specific commitment in our Corporate Plan 2020-24. During the engagement on our Corporate Plan residents told us that tackling the Climate Emergency was really important to them which is why our Corporate Plan prioritises climate action through the theme of tackling the climate emergency, and embeds sustainability throughout the other themes. Not only will the Climate Action Plan improve our council operations and services for residents, it will also contribute to the urgent global climate change agenda, which we were so recently reminded of at COP26 in Glasgow, as well as the UK's net zero targets. We also look forward to working in partnership across the county to address our wider district wide emissions, further contributing to UK and international targets.

While a lot of climate action is taking place at the global and national scale, we must also recognise that during the development of this plan, we experienced, and are still living through, the Covid-19 pandemic. The pandemic posed many challenges and impacted the livelihoods of many. Changes as a result of the pandemic have also had positive outcomes for the environment including reduced travel, shopping locally, and enjoying our surrounding nature, all of which contribute to lowering carbon emissions.

Over the past few years we have seen a lot of climate action in our communities. This has included setting up repair cafes and refill stations, planting trees and community gardens. We are grateful for all the work our communities are doing and we will continue to support this work and hope to further build these relationships.

We are lucky to live in a district with green and open spaces and we want to continue to provide a place for our communities to thrive. While we live in a beautiful environment, we are experiencing extreme weather conditions, including flooding, heavy rainfall and hot summers, affecting some residents more than others. Ensuring our policies and plans have climate action at their core will help to address and hopefully improve these situations.

**Cllr Catherine Webber**
**Cabinet Member for Climate Emergency and Environment**

**Cllr. David Grant**
**Chair of Climate Emergency Advisory Committee (CEAC)**

**Cllr Emily Smith**
**Leader of Vale of White Horse District Council**

# Welcome from Simon Hewings, Head of Finance, Vale of White Horse District Council

This Climate Action Plan comes at an interesting time for us – with council budgets more constrained than ever, especially in the midst of the Covid-19 pandemic, addressing the climate emergency will be a challenge. As a council we continue to focus on providing core services for our residents as well as the wellbeing and resilience of our communities, our economic prosperity, and now taking climate action.

Financial implications are at the core of our decision making, and whilst this will always be a priority for us, climate considerations also need to be included to ensure we reach our carbon neutral targets. All our report writing templates will include a climate implications section to ensure we have considered the environmental impact of our work.

This Plan has been written in collaboration across the council to ensure that the actions are honest, feasible and realistic, while also pushing us to make changes and improvements to our services. I have reviewed the actions and believe that through the skills and experience of our staff, working in partnership, lobbying government on this issue, and seeking external funding, we will be able to make an impact locally on this global issue.

We will continue to be open and accountable in all areas of work, this will also apply to how we monitor the progress of our Climate Action Plan and being upfront about any challenges we face. The Plan will be monitored closely by officers and councillors to ensure we are on track to meet our carbon neutral targets.

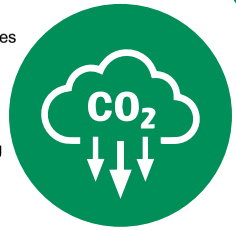
# Introduction

The purpose of this Climate Action Plan is to outline how the Vale of White Horse District Council will meet its target of becoming a carbon neutral council by 2030, with a 75 per cent reduction in carbon emissions by 2025. This plan focuses on the council's own emissions to ensure our operations and service provision are carbon neutral by our target date, leading by example before focusing on our district target to be carbon neutral by 2045, with a 75 per cent reduction in carbon emissions by 2030.

This Plan presents a set of actions that will help us achieve our target of carbon neutrality through direct initiatives using our statutory powers, strategic policymaking, or by enabling behaviours and working with others.
Our vision is for climate action to be embedded throughout all our ways of working and services, to support our communities to do the same, and to work in partnership to make a greater impact on our target.

This Plan first provides policy context to set the scene for climate action globally, nationally and locally, including our climate actions so far, followed by an outline of our strategic approach to climate action, our reporting methods and then our action plan.

**Carbon neutral,**
*or 'net zero carbon', means there is a balance between the carbon emissions released into the atmosphere and the amount of carbon emissions removed from the atmosphere.*



# Policy Context

There are a range of global, national, regional and local policies setting guidance and targets for taking climate action.

Internationally, the United Nations Framework Convention on Climate Change (UNFCCC) is the United Nations entity responsible for responding to climate change, and oversees the implementation of the Paris Agreement. The Paris Agreement is a legally binding international treaty on climate change which aims to limit the global temperature increase in this century to 2 degrees Celsius, preferably to 1.5 degrees Celsius, above preindustrial levels. It is a landmark treaty as it was adopted by 196 Parties, including the UK, at COP21 in Paris in 2015, bringing nations together to tackle climate change. At COP26 in 2021, the Glasgow Climate Pact urged for more urgent action and financing to meet the goals of the Paris Agreements. Along with this agreement, the UN adopted the Sustainable Development Goals (SDGs) in 2015 which are a global urgent call to action to achieve a better and more sustainable future for all by 2030. Climate change is embedded throughout the goals, and is specifically addressed in goal 13, take urgent action to combat climate change and its impacts.

Nationally, the Climate Change Act 2008, updated in 2019, commits the UK to a 100 per cent reduction in carbon emissions, or net-zero, by 2050. The Act also resulted in the formation of the Committee on Climate Change (CCC) which is an advisory committee to the government on climate. In 2021 the Government published its Net Zero Strategy: Build Back Greener which outlines how the UK will manage its carbon budgets and sets out the UK's vision for a decarbonised economy by 2050. The Environment Act 2021 sets legislation to protect and enhance our environment, including policies around waste and recycling, air quality and water resources.

Regionally, the Pathways to zero carbon Oxfordshire (Pazco) report was published in 2021 to address how Oxfordshire can achieve net-zero emissions by 2050. There are also policy documents on specific sectors including the Oxfordshire Energy Strategy, which outlines how the county will be at the forefront of energy innovation to foster clean growth to reduce countywide emissions by 50 per cent by 2030 (compared to 2008 levels) and set a pathway to achieve zero carbon growth by 2050, and the Oxfordshire Plan 2050 which outlines how new homes and infrastructure will be developed across the county while helping to tackle climate change. As a council, we have also signed up to One Planet Oxfordshire, a co-created vision and action plan on the future of a more sustainable Oxfordshire.

Locally, as a council we declared a climate emergency in February 2019. As a result of these declarations, we set our targets to:

- **Be carbon neutral within our own operations by 2030, with an aim for a 75 per cent reduction in carbon emissions in our own operations by 2025**
- **Be a carbon neutral district by 2045, with an aim for a 75 per cent reduction in carbon emissions in the district by 2030**

Our Climate Emergency Advisory Committee (CEAC) was formed in October 2019 to advise on matters relating to the climate and ecological crises, and to recommend actions, policies and practices to reduce damage to the environment to Cabinet.

Climate action was also identified as a priority in our Corporate Plan 2020-2024, with one of the six themes within the Plan being tackling the climate emergency. Work to address the climate emergency is also integrated throughout other themes of the Corporate Plan. Publishing this Climate Action Plan is one of the projects within the Plan. The Climate Action Plan runs in line with the dates of the Corporate Plan and contributes to our strategic vision and operations as a council.

# Our Journey So Far

While this is our first Climate Action Plan, we have already implemented a number of projects and policies that address the climate emergency, including:

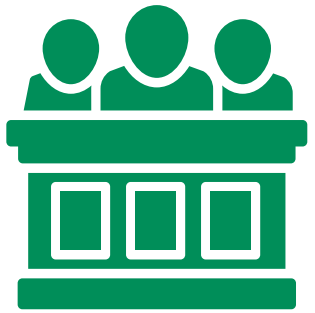
The publication of our tree policy for planting trees on council land, supporting the increase of tree planting across our districts

Incorporating carbon neutral and sustainable features throughout our design guide

Staff contracts have been updated to support working from home from a climate and covid safe perspective

Create a Climate Action Fund to accelerate local action

We have partnered with Oxfordshire Greentech to support local businesses to reduce carbon emissions



The 2021 town and parish forum focused on 'climate action – how can we take action together' with the aim to hear from town and parish councils on how they would like to see the climate emergency addressed and what climate action they are taking locally

We are implementing flood alleviation schemes to combat risks arising from climate change

# Measuring and Reporting

To measure our progress in achieving our carbon neutral targets, we divided the actions in this Plan into strategic, direct and enabling actions:

| Action category | Explanation | Measuring method |
|---|---|---|
| **Strategic** | Strategic actions are those which change our approach to work and the provision of our services to reach our carbon neutral targets, and these changes will result in reductions in carbon emissions over time. These actions include updates to policy and strategy documents to better address the climate emergency, embedding climate considerations in decision making, and providing training to staff to create behaviour change in our ways of working. | While it will be difficult to measure the specific reductions in carbon emissions from each strategic action, overall reductions in the council's carbon emissions will be seen over time in our annual carbon emission baseline report as a result of taking these actions. |
| **Direct** | The results of these actions will produce a quantifiable reduction in carbon emissions from implementing a specific project or making a direct change to a service. For example, we will be able to measure the reduction in our carbon emissions from swapping to electric vehicles, or from implementing a new waste management contract. | Emissions from direct actions will be calculated using the glidepath tool, where we will be able to specifically measure the change in emissions over time. |
| **Enabling** | Enabling actions are those where we are encouraging and supporting behaviour change across our district by sharing information, advice and guidance. These actions will contribute to an overall reduction in carbon emissions across the council and district. | We will see the impact of our enabling actions through an overall reduction in carbon emissions in our annual carbon emissions baseline report. |

These three categories provide us with the methodology to review our reduction in carbon emissions over the next three years. The Plan also includes the specific reporting measures we will be monitoring for progress of each action, including the reporting type of the measure, whether they will be reported on through narrative, narrative with quantitative elements, or quantitative updates. Progress on actions will be monitored quarterly in line with the Council's Corporate Performance Management Framework, and will be reviewed at each CEEAC meeting and reported to Cabinet. Reviewing progress on the actions quarterly will allow us to keep track of the short and long-term implementation, progress and outcomes of each action. Annually, the council's greenhouse gas emissions report will be reviewed to see the reduction in our overall carbon emissions, monitoring our progress to reach our carbon neutral target.

It is important to note that this Plan is based on national policies and strategies at the time of writing. We hope that those policies and strategies will change over the course of this Plan to include higher, more ambitious standards and therefore some of our actions may be superseded.

## The Plan

The below table presents the actions the council will take to reduce its carbon emissions 2022-24. The plan has been divided into seven themes to categorise the actions. These themes are:

| Theme | Goal |
|---|---|
| **Our ways of working** | To make climate action inherent in all the council's work by designing and updating our policies, strategies and governance with the climate emergency at their core |
| **Our service delivery** | To plan and deliver services to our residents in ways that reduce carbon emissions and prepare our district for future ways of living |
| **Our people** | To create a culture of climate action amongst staff and councillors in the workplace |
| **Our land** | To approach our land management with sustainable and climate-friendly best practices |
| **Our buildings** | To decarbonise our buildings and their operations to ensure they are fit for the future |
| **Our communities** | To guide and support the district's businesses, voluntary sector and communities to take action on the climate emergency |
| **Our partners** | To work in partnership to reduce carbon emissions across the districts and support county-wide initiatives, making a greater impact together |

# Strategic Approach

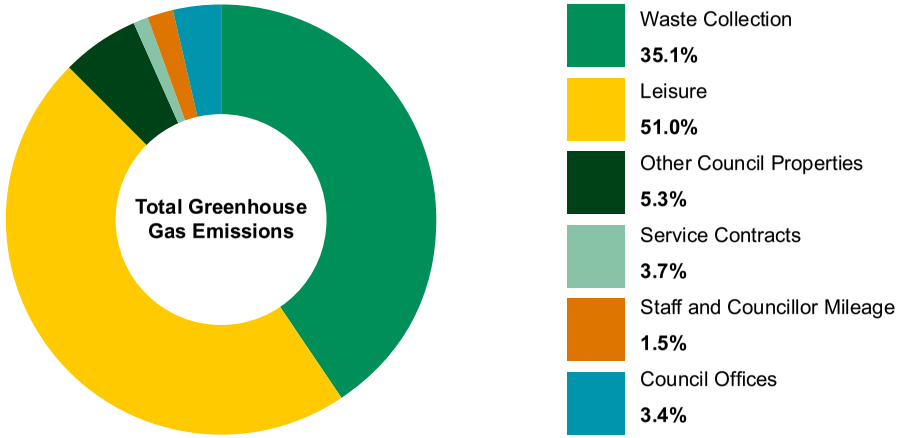
This plan focuses on how we will reduce carbon emissions from our own operations to make us a carbon neutral council. Our approach to this work is guided by our data and five principles, outlined below.

## Our Data

Looking at our council carbon emission data from our baseline year 2019/20, around half of our emissions come from our four leisure centres, while over one third of our carbon emissions come from our waste collection services. It is vital that we tackle our leisure and waste emissions to make the biggest impact on our carbon neutral target, which is reflected in specific actions in this Plan. Other emitters include staff and councillor mileage, our offices and properties, and other service contracts, which are also addressed in actions in this plan.

In addition to the quantitative data, we have used qualitative data to develop this plan, including feedback from the Corporate Plan consultation with residents in August 2020, where the climate emergency featured heavily, and from discussions on taking climate action at the Town and Parish Forums held in May 2021.

**Vale of White Horse District Council Greenhouse Gas Emissions 2019/20**




Source: Vale of White Horse District Council Greenhouse Gas emissions report 2019/2020

## Our Principles

This Plan is guided by five principles, which we will embed in our approach to climate action as an organisation and were used to develop the actions in this plan. We will use these principles as a benchmark for future plans and policies we develop and will also use them to inform current projects. The five principles are:

| | |
|---|---|
| **Political commitment to climate action** | Political will locally and regionally to drive reductions in carbon emissions is critical in the absence of a statutory duty on local authorities to take climate action.<br>This commitment is evident at Vale of White Horse through the dedicated position of a cabinet member for climate emergency and environment. This position has a responsibility to ensure that this commitment is embedded across all actions and plans and that climate implications in decisions are considered and examined.<br>Driving forward this commitment to climate action will be vital going forward to make progress on our carbon neutral targets. |
| **Putting climate action at the heart of our decision making** | Having climate considerations at the core of our decision making, policies and ways of working is vital so that we create an organisational culture that lasts not just during the lifetime of this Plan but beyond. |
| **Working in partnership across the districts and county** | Climate Action needs everybody. We acknowledge that we cannot do this alone and there is collective strength in working in partnership to make a greater impact regionally, by pooling our resources and influence together. |
| **Commitment to inclusive engagement** | Addressing the climate emergency is a continual process and we need to ensure that our ongoing climate actions and communications meet the different needs of our communities and environment and are accessible and engaging for all. |
| **Influencing and providing advice** | Our engagement opportunities and activities are two-fold: influencing our government to lobby for national changes required to help us achieve our targets and providing advice to our communities, including our residents and businesses, to support their climate action journeys. |

# The Plan

## Our ways of working

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **Update the Corporate Delivery Framework to include considerations for climate impact and carbon emissions** | WOW1 | Narrative | Report on the climate impact and carbon emission considerations included in the Corporate Delivery Framework providing examples | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services and Transformation |
| **Implement internal governance to progress and monitor the Climate Action Plan** | WOW2 | Narrative | Update on the internal governance including its structure and approach to progressing and monitoring the Climate Action Plan | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services and Transformation |
| **Publish an internal toolkit with guidance for staff on how to assess the climate implications of projects and proposals** | WOW3 | Narrative | Update on the content of the toolkit and examples of projects and proposal that have used learning from the toolkit for the climate implications section of reports | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services and Transformation |
| **Develop and implement measures for monitoring procurement contracts based on carbon emissions and climate action** | WOW4 | Narrative | Update on monitoring of procurement contracts based on carbon emissions and climate action, providing examples of relevant contracts | strategic | Head of Finance | Cabinet Member for Finance and Corporate Assets |
| **Update the contract evaluation quality scoring procedure to include carbon reduction criteria** | WOW5 | Narrative | Report on how the contract evaluation quality scoring criteria has been updated to include carbon reduction criteria, providing examples of relevant awarded contracts | direct | Head of Finance | Cabinet Member for Finance and Corporate Assets |
| **Deliver staff training on the Procurement Strategy which includes understanding of carbon reduction objectives and criterion** | WOW6 | Narrative with quantitative elements | Percentage of staff who completed the procurement training quarterly / report on how the training has impacted procurement contracts, providing relevant examples | strategic | Head of Finance | Cabinet Member for Corporate Services and Transformation |
| **Conduct a review of all report writing templates, adding a climate implications section where missing** | WOW7 | Narrative with quantitative elements | Percentage of report writing templates that include a climate implications section / narrative on the updates to report writing templates | strategic | Head of Finance | Leader of the Council |

# The Plan

## Our ways of working

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **Divest direct investments from environmentally harmful activities where possible, whilst protecting the security of tax-payer funds** | WOW8 | Narrative | Narrative update on the introduction of the investment strategy and subsequent decision-making around investing | strategic | Head of Finance | Cabinet Member for Finance and Corporate Assets |
| **Incorporate a policy statement on environment / social / governance factors in the financial implications section of reports** | WOW9 | Narrative | Update on the statement included in council templates under financial implications | strategic | Head of Finance | Cabinet Member for Finance and Corporate Assets |
| **Engage with the council's investment portfolio to ask for and review their carbon reduction plans as part of decision making for the treasury management strategy** | WOW10 | Narrative with quantitative elements | Number of investment portfolios reviewed for their carbon reduction plans / narrative on any changes in investments based on investment portfolio carbon reduction plans / percentage of council portfolio in Paris Agreement aligned companies | strategic | Head of Finance | Cabinet Member for Finance and Corporate Assets |
| **Review internal audit processes and where appropriate include risk considerations for the climate emergency** | WOW11 | Narrative | Report on how the internal audit processes have been updated to include carbon emission considerations | strategic | Head of Finance | Cabinet Member for Finance and Corporate Assets |
| **Refine criteria for community infrastructure levy (CIL) funding to maximise opportunities for including carbon reduction measures in projects and supporting climate action projects** | WOW12 | Narrative with quantitative elements | Narrative update on CIL spend to support the delivery of local infrastructure<br><br>Quantitative elements - Total CIL spend and spend break down | strategic | Head of Policy and Programmes / Head of Finance | Cabinet Member Development and Infrastructure |
| **Promote community infrastructure levy (CIL) criteria to all relevant staff to ensure they maximise carbon emission reductions in all CIL projects** | WOW13 | Narrative with quantitative elements | Percentage of CIL projects that include carbon emission reduction considerations/ relevant project proposals, providing examples | strategic | Head of Policy and Programmes / Head of Finance | Cabinet Member Development and Infrastructure |
| **Include more ambitious climate criteria in the conditions of our affordable housing grant funding** | WOW14 | Narrative | Updates on changes to the climate criteria of the affordable housing grant funding and how this has impacted new affordable housing developments, providing examples | strategic | Head of Development and Corporate Landlord | Cabinet Member Development and Infrastructure |
| **Include policies in the Joint Local Plan that will help deliver zero carbon development and encourage more sustainable choices** | WOW15 | Narrative | Narrative update on sustainable and net zero planning policies being developed and included in the emerging JLP | strategic | Head of Policy and Programmes | Cabinet Member Corporate Services and Transformation |

# The Plan

## Our ways of working

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **Produce an options paper for setting up a carbon offsetting scheme for developers as part of the new Joint Local Plan** | WOW16 | Narrative | Report on options paper development and suggested ways forward | direct | Head of Planning | Cabinet Member Development and Infrastructure |
| **Produce an options paper for pool electric vehicles for use by council staff to reduce emissions from business mileage, implementing if approved** | WOW17 | Narrative | Update on the development of options paper for piloting pool electric vehicles, including on the carbon emission savings and decision making progress | direct | Head of Policy and Programmes | Cabinet Member for Corporate Services and Transformation |
| **Develop and implement an internal communications plan to keep staff updated on climate action work, including useful advice and guidance on how to incorporate climate action into projects and programmes** | WOW18 | Narrative with quantitative elements | Data on the number of internal communications campaigns on climate action work and a narrative update on the type of information shared and any feedback from staff on the use of the information | enabling | Head of Corporate Services | Cabinet Member Community Engagement |
| **Move to a digital by default approach for virtual meetings where possible given the current conditions around decision making in Local Government** | WOW19 | Quantitative | Percentage of virtual meetings taken place, benchmark to include CEAC, Scrutiny, Cabinet and Council meetings | direct | Head of Finance | Leader of the Council |
| **Improve our use of existing technology to move to digital by default working** | WOW20 | Narrative with quantitative elements | Update on the use of technology for meetings; data on percentage of MFD printing | direct | Head of Corporate Services | Cabinet Member for Corporate Services and Transformation |
| **Develop and implement an anti-idling policy for staff and contractors on council business, to ensure engines are turned off when appropriate** | WOW21 | Narrative | Update on the development of the policy and examples of anti-idling implementation from staff and contractors | direct | Head of Development and Corporate Landlord | Cabinet Member for Climate Emergency and Environment |

# The Plan

## Our service delivery

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **a) Prepare new waste management approach to align with provisions of the Environment Bill** | SD1 | Narrative | Narrative report to outline steps to influence partners and our actions to reduce overall waste | direct | Head of Housing and Environment | Cabinet Member Climate Emergency and Environment |
| **b) Specify new waste management contract with route optimisation, collection frequency and vehicle size to minimise carbon emissions** | SD2 | Narrative | | direct | Head of Housing and Environment | Cabinet Member Climate Emergency and Environment |
| **c) Trial electric refuse vehicles and other relevant vehicle options, to identify the most suitable vehicles for reducing carbon emissions whilst maintaining service delivery** | SD3 | Narrative | | direct | Head of Housing and Environment | Cabinet Member Climate Emergency and Environment |
| **d) Replace end of life waste collection vehicles with electric fleet where range available allows** | SD4 | Narrative | | direct | Head of Development and Corporate Landlord | Cabinet Member Climate Emergency and Environment |
| **Explore opportunities for a new waste depot including research into renewable energy supplies** | SD5 | Narrative | Update on proposals for a new waste depot, including potential carbon reduction figures | direct | Head of Housing and Environment | Cabinet Member Climate Emergency and Environment |
| **Develop a business case and implement a delivery plan for council vehicles to be zero emission by 2025, where available on the market** | SD6 | Narrative with quantitative elements | Data on potential carbon reduction savings from switching vehicles to zero emission; narrative report on business case development and delivery plan for doing so, including market options for electric vehicles (EVs) | direct | Head of Housing and Environment | Cabinet Member for Finance and Corporate Assets |

# The Plan

## Our service delivery

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **Install EV charge points in council depot and other locations as necessary to meet needs of council fleet** | SD7 | Narrative with quantitative elements | Data on the number of EV charge points installed for use by council fleet; narrative update on the location of the EV charge points and how they meet the needs of the council fleet | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |
| **Feedback on planning applications to include signposting to information sources to improve the energy efficiency of proposals** | SD8 | Quantitative | Data on the percentage of applications that include sign posting to energy efficiency advice | enabling | Head of Planning | Cabinet Member Community Engagement |
| **Update the council planning and development webpages to signpost to advice on energy efficiency considerations for inclusion in planning applications** | SD9 | Narrative with quantitative elements | Update on the energy efficiency information provided on the council webpages; data on the number of clicks on the links | enabling | Head of Planning | Cabinet Member Community Engagement |
| **Work with our town and parish councils who are developing projects that reduce carbon emissions locally by providing advice on planning permissions needed for their projects to be a success** | SD10 | Narrative with quantitative elements | Report on support provided to town and parish councils on their carbon reduction projects; data on number of carbon emissions reduction projects submitted by town and parish councils | enabling | Head of Planning | Cabinet Member Community Engagement |
| **Support the implementation of the air quality action plan across the district** | SD11 | Narrative with quantitative elements | Narrative containing updates/changes to AQ monitoring techniques, an update on work with partners to monitor AQ and details of published AQ measures | strategic | Head of Housing and Environment | Cabinet Member Climate Emergency and Environment |

# The Plan

## Our people

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **Provide all-staff and councillor training on the council's climate action plan and carbon literacy** | P1 | Narrative with quantitative elements | Data on percentage of staff that have taken the climate action plan training; narrative on how staff have integrated the training into their work, using case studies | strategic | Head of Corporate Services | Cabinet Member for Corporate Services and Transformation |
| **Provide enhanced specialist training on latest carbon reduction or climate action approaches to relevant staff and councillors** | P2 | Narrative with quantitative elements | Data on percentage of specialist training delivered to staff; narrative on how staff identify the training they need and how they have used the training in their work | strategic | Head of Corporate Services / Head of Policy and Programmes | Cabinet Member for Corporate Services and Transformation |
| **Ensure there is relevant skill and capacity to support grant application writing and bidding for climate related funds, maximising the opportunities to include carbon emissions reductions and energy efficiency in all projects** | P3 | Narrative with quantitative elements | Dedicated bid writing resource secured;<br>Data on the number of applications to grants and funds that relate to climate action and carbon emission reduction; narrative report on grant writing skills and training that has taken place to maximise opportunities on bid writing | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services and Transformation |
| **Implement a green travel plan for all staff and councillors, including a digital by default approach where possible to reduce travel** | P4 | Narrative with quantitative elements | Data on staff mileage once this plan is implemented and narrative report on the changes to staff travel as a result of the plan | direct | Head of Corporate Services | Cabinet Member for Corporate Services and Transformation |
| **Set up green champions network for interested staff to support climate work** | P5 | Narrative | Report on outcomes of green champion network meetings, including case studies of green champions to highlight key areas of work and impact of the champions | strategic | Head of Corporate Services | Cabinet Member for Corporate Services and Transformation |
| **Incorporate climate action opportunities within council volunteering scheme for staff** | P6 | Narrative with quantitative elements | Data on the number of climate action opportunities within council volunteering scheme and data on the number of take up of these opportunities; case studies from staff on how they have engaged with this opportunity | strategic | Head of Corporate Services | Cabinet Member for Corporate Services and Transformation |

# The Plan

## Our land

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **Following the grounds maintenance operational review, update grounds maintenance operations to enhance biodiversity and tree cover including considering the need for mowing, opportunities to allow for wilding, and reducing the use of pesticides and herbicides where possible** | L1 | Narrative | Report sharing the updates to the grounds maintenance operations that address the climate emergency and how they support biodiversity | direct | Head of Development and Corporate Landlord | Cabinet Member Finance and Corporate Assets |
| **Identify sites for new tree planting and wilding opportunities on our land or through partnership opportunities on privately owned land to support natural carbon capture** | L2 | Narrative | Report on identification of sites for new tree planting opportunities, including plans to plant trees on these sites | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |
| **Prepare a business case and, if approved, implement a local renewable energy project, such as a solar farm, to address unavoidable council emissions** | L3 | Narrative with quantitative elements | Data on the amount of renewable energy produced and emissions offset; narrative update on the progression of plans for this project and how the renewable energy produced neutralises council emissions | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |
| **Deliver the Park and Charge scheme, installing EV charge points in our car parks, in partnership with Oxfordshire County Council** | L4 | Narrative with quantitative elements | Data on the number of EV charge points installed in council car parks; narrative update on the partnership approach for delivering this project | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |
| **Develop an options paper for installing public EV charging points on additional council premises, including funding sources available** | L5 | Narrative with quantitative elements | Update on the business case development for installing public EV charging points; data on energy use of the points, including how much charge they provide to EVs | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |

# The Plan

## Our buildings

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **a) Complete energy efficiency and site decarbonisation assessments for all leisure centres** | B1 | Narrative with quantitative elements | Data on the energy efficiency of all leisure centres; narrative report on site decarbonisation assessments, with projections for how the sites will be decarbonised | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |
| **b) Following site assessments of leisure centres, prepare for external funding opportunities, including soft market testing** | B1 | Narrative with quantitative elements | Narrative update as to current initiatives to increase external funding for Council activities, with details of additional resources committed to support these activities<br><br>Specific elements which should be included - proportion of spend on leisure/community facilities vs amount funded by Council; externally funded Capital schemes; total external funding received figure | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |
| **a) Complete energy efficiency and site decarbonisation assessments for all non-leisure operational properties** | B2 | Narrative with quantitative elements | Data on the energy efficiency of all non-leisure centres; narrative report on site decarbonisation assessments, with projections for how the sites will be decarbonised | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |

# The Plan

## Our buildings

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **b) Prepare for external funding opportunities for non-leisure properties, particularly properties with an end-of-use heating plant, including carrying out soft market testing** | B2 | Narrative with quantitative elements | Narrative update as to current initiatives to increase external funding for Council activities, with details of additional resources committed to support these activities<br><br>Specific elements which should be included - proportion of spend on leisure/community facilities vs amount funded by Council; externally funded Capital schemes; total external funding received figure | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |
| **Include carbon and energy reduction targets in management plans for the monitoring of site operations including all leisure centres to enforce and encourage low carbon operational behaviour in council assets** | B3 | Narrative with quantitative elements | Report on the changes to the carbon and energy reduction targets in the criteria for monitoring operations and report on the changes to operational procedures to meet carbon and energy reduction targets; data on carbon emissions from operations | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |
| **Develop a policy to agree an energy efficiency standard for new asset acquisitions and council owned builds** | B4 | Narrative | Update on the development of the energy efficiency standards policy for new asset acquisitions and builds, including case studies of how this has been implemented | direct | Head of Development and Corporate Landlord | Cabinet Member for Finance and Corporate Assets |

# The Plan

## Our communities

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **Implement an external communications plan which shares updates on the climate action work undertaken by the council, and advice and guidance to residents, businesses and the voluntary and community sector on reducing carbon emissions. To include:** | C1 | Narrative | Narrative update on comms and engagement activities which interface with communities, schools and other local organisations | enabling | Head of Corporate Services | Cabinet Member Community Engagement |
| **Advice and guidance on circular economy principles and how to implement them, especially for businesses and the voluntary and community sector** | C2 | Narrative | | | Head of Corporate Services | Cabinet Member Community Engagement |
| **Advice and guidance on energy efficiency of operations, including consideration for delivery options and the energy efficiency of buildings used by businesses and the voluntary and community sector** | C3 | Narrative | | | Head of Corporate Services | Cabinet Member Community Engagement |
| **Share climate friendly lifestyle changes, including ways to make homes more energy efficient** | C4 | Narrative | | | Head of Corporate Services | Cabinet Member Community Engagement |
| **Promote climate funding opportunities for businesses, voluntary and community sectors, and residents** | C5 | Narrative | | | Head of Corporate Services | Cabinet Member Community Engagement |
| **Promote community sharing and reuse to reduce waste and unnecessary consumption** | C6 | Narrative | | | Head of Corporate Services | Cabinet Member Community Engagement |
| **Promote relevant housing energy efficiency schemes, including grants, to residents, landlords and housing associations** | C7 | Narrative | | | Head of Corporate Services | Cabinet Member Community Engagement |

# The Plan

## Our communities

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **Include in Community Employment Plans considerations for addressing the councils climate neutral targets through commitments such as green skills training, sourcing through a local and sustainable supply chain, supporting local social enterprises and charities and accessing local employment** | C8 | Narrative with quantitative elements | Update on the conditions of Community Employment Plans that address the climate emergency and how they are being implemented by developers; data on the number of Community Employment Plans implemented with conditions that address the climate emergency | strategic | Head of Development and Corporate Landlord | Cabinet Member Community Engagement |
| **Support communities with their neighbourhood planning by providing up-to-date advice and guidance on climate measures and actions, encouraging climate considerations to be at the core of neighbourhood plans** | C9 | Narrative with quantitative elements | Data on the number of neighbourhood plans developed; Narrative update on the types of climate actions incorporated into neighbourhood plans | enabling | Head of Policy and Programmes | Cabinet Member for Corporate Services and Transformation |
| **Support taxi drivers in switching to electric vehicles, including reviewing options to incentivise the switch through fees and charges** | C10 | Narrative with quantitative elements | Data on the number of taxi drivers driving electric vehicles and narrative update on the support to taxi drivers for doing so | enabling | Head of Housing and Environment | Cabinet Member Healthy Communities |
| **Organise quarterly climate focused network meetings for town and parish councils, and voluntary and community organisations, linking with existing networks** | C11 | Narrative with quantitative elements | Data on number of meetings held; narrative update on the agendas, outcomes and actions from the meetings | enabling | Head of Corporate Services | Cabinet Member Community Engagement |

# The Plan



| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **Build relationships with town and parish councils to support and encourage their climate action initiatives** | OP1 | Narrative | Update on how the council has worked with town and parish councils on climate action initiatives, including case studies | strategic | Head of Policy and Programmes | Cabinet Member Community Engagement |
| **Identify areas in our community that are most vulnerable to the effects of climate change to ensure they are properly supported and protected to promote wider community wellbeing** | OP2 | Narrative | Update on the identification of areas most vulnerable to the effects of climate change and how the council has supported them to adapt to these changes, including through initiatives such as Better Housing Better Health | strategic | Head of Policy and Programmes | Cabinet Member Corporate Services and Transformation |
| **Work with Oxfordshire County Council to support active and sustainable travel infrastructure initiatives** | OP3 | Narrative with quantitative elements | Narrative update on progress toward completion of map, once map completed, this should transition to an annual review of the accuracy of map | direct | Head of Policy and Programmes | Cabinet Member Corporate Services and Transformation |
| **Work with the Future Oxfordshire Partnership on a county-wide approach to reducing carbon emissions, building on the strategic vision and Pathways to Zero Carbon Oxfordshire** | OP4 | Narrative | Update on progress on Future Oxfordshire Partnership's county-wide approach to reducing carbon emissions, including examples of projects and programmes that address the strategic vision and Pathways to Zero Carbon Oxfordshire | strategic | Head of Policy and Programmes | Cabinet Member for Strategic Partnerships and Place |

# The Plan

## Our partners

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | Vale Cabinet Lead |
|---|---|---|---|---|---|---|
| **With our partners, support the development of a coordinated retrofit programme for Oxfordshire through our role in the Environmental Advisory Group of Future Oxfordshire Partnership** | OP5 | Narrative | Narrative report on work influencing work, comms activity and direct engagement with residents. | direct | Head of Policy and Programmes | Cabinet Member Strategic Partnerships and Place |
| **Support Registered Social Landlords in applying for retrofit funding, such as Social Housing Decarbonisation Funding** | OP6 | Narrative | Narrative update on engagement with Registered Social Landlords on retrofit funding | direct | Head of Housing and Environment | Cabinet Member Healthy Communities |
| **Use our membership of Oxfordshire Local Enterprise Partnership (OxLEP) to ensure rapid growth of the green economy** | OP7 | Narrative | Update on the council's influence in OxLEP to ensure rapid growth of the green economy, including examples of projects and programmes that address this work | strategic | Head of Policy and Programmes | Cabinet Member for Strategic Partnerships and Place |
| **Support and influence the Oxfordshire Plan 2050 ensuring climate considerations are integrated throughout the plan** | OP8 | Narrative | Narrative report on work to support the Oxfordshire Plan | strategic | Head of Policy and Programmes | Cabinet Member for Strategic Partnerships and Place |
| **Utilise the opportunity of the Oxford to Cambridge Arc to advance corporate objectives around the Climate Emergency** | OP9 | Narrative | Narrative update on the work of the Oxford-Cambridge arc and our influencing activity | strategic | Head of Policy and Programmes | Cabinet Member for Strategic Partnerships and Place |
| **Support the Thames Valley Rivers network to meet their aims and use this group to facilitate and influence work cross party and cross boundary to end pollution in the river and promote the sustainable use and enjoyment of the River Thames** | OP10 | Narrative | Update on work with the Thames Valley Rivers network, including case studies of projects and programmes that have been implemented to meet the aims of the network | enabling | Head of Policy and Programmes | Cabinet Member Climate Emergency and Environment |
| **Engagement across the energy sector on activity required to move to carbon neutral and work with them to tackle the challenge of grid capacity, time of day demand and energy infrastructure** | OP11 | Narrative | Update on engagement with the energy sector and examples of work with them to tackle the challenge of grid capacity, time of day demand and energy infrastructure | direct | Head of Policy and Programmes | Cabinet Member Corporate Services and Transformation |
| **Partner with Good Food Oxfordshire to support their Good Food Strategy for Oxfordshire, ensuring climate considerations are included throughout the strategy** | OP12 | Narrative | Update on the development of the Good Food Strategy for Oxfordshire, including examples of climate considerations | strategic | Head of Policy and Programmes | Cabinet Member Corporate Services and Transformation |

**Appendix CL2.24**

**Vale of White Horse District Council Climate Action Plan 2023-2024**

# Climate Action Plan

# PERFORMANCE REPORT

## 2023/24

## Quarter TWO

**October 2023**

Vale of White Horse District Council

# Table of Contents


| | |
|---|---|
| Introduction | 3 |
| Quarter context | 4 |
| Quarter two performance highlights | 6 |
| THEME 1 Our ways of working | 7 |
| THEME 2 Our service delivery | 8 |
| THEME 3 Our people | 9 |
| THEME 4 Our land | 10 |
| THEME 5 Our buildings | 11 |
| THEME 6 Our communities | 12 |
| THEME 7 Our partners | 13 |
| Theme 1: Our ways of working - Performance updates against reporting measures | 14 |
| Theme 2: Our service delivery - performance updates against reporting measures | 21 |
| Theme 3: Our people - performance updates against reporting measures | 24 |
| Theme 4: Our land - performance updates against reporting measures | 26 |
| Theme 5: Our buildings - performance updates against reporting measures | 28 |

# Introduction

The Vale of White Horse District Council **Climate Action Plan** (CAP) 2022-24 sets out to demonstrate and deliver the council's commitment to the Corporate Plan objective of Tackling the Climate Emergency and target of becoming a carbon neutral council by 2030, with a 75 per cent emissions reduction by 2025.

Progress on the actions and outputs in the CAP are reported quarterly, in line with the council's Corporate Performance Management Framework. This report is the second iteration, and it is expected that it will evolve in line with the approach to Performance Management being embedded by the council, as well as from feedback from senior officers and Members. This report provides a strategic overview of the climate action performance across the council for quarter two 2023/2024 (01 July to 30 September 2023) and should be reviewed in context with the council's quarterly **Corporate Plan Performance Report**. The council's **greenhouse gas emissions** are also reported and published annually.

The CAP is one piece of a much larger picture, consisting of national, regional and local initiatives and plans all of which influence our priorities. The CAP was designed to be a live document, where quarterly progress reporting may result in the reprioritisation or refocusing of actions by Cabinet where necessary.

# Quarter context

**HM Government and Net Zero**

At the beginning of this quarter, HM Government unveiled its third National Adaptation Programme (NAP3), which sets out a strategic five-year plan with aims to boost resilience and protect people, homes, businesses and the UK's cultural heritage against climate change risks such as flooding, drought and heatwaves. The Climate Change Act requires the government to prepare for a changing climate and publicly report on the impact of climate change and plans to adapt to the risks and opportunities posed by climate change. The NAP is part of the response to this and every 5 years, the government produces an assessment of the risks and opportunities from climate change and reports on how we will adapt in the NAP.

In July, the Department for Energy Security and Net Zero (DESNZ) published its UK Energy in Brief 2023 report, which stated that solar photovoltaics (PV) increased its generation by 10% between 2021 and 2022. DESNZ detailed that this increase was driven by longer average sunlight hours and 5.3% increase in capacity.

This is helping to generate a total of 135TWh of electricity from renewable energy sources – a new record for the UK. According to DESNZ's UK Energy in Brief 2023 report, the increase on the year before is primarily due to "more favourable weather conditions and new offshore wind capacity". Offshore wind generation increased the most out of the renewable sources.

Moreover, in September, Communities Secretary Michael Gove lifted restrictions on building onshore windfarms in England, overturning a ban that has been in place since 2015. The new rules require local authorities to consider the views of the entire community rather than a single objection. They will be allowed to identify new onshore wind in other ways apart from a local plan, and the government plans to introduce an incentive scheme to make sure local residents benefit from new developments. The changes aim to speed up the delivery of wind power projects where there is community support.

In September, Prime Minister Rishi Sunak also announced HM Government's decision to delay the ban on new diesel and petrol cars from 2030 to 2035. The Prime Minster set out in his speech that the revised path will provide flexibility while also helping grow the economy, through offering certainty for manufacturers and helping families make the switch to electric. The implications of this change, together with others announced by the Prime Minister, are not easy to predict but are likely have an impact on the council's targets for achieving a net zero district.

Additionally at the end of this quarter, HM government set out the timetable for 'Biodiversity Net Gain'. Biodiversity Net Gain (BNG) was introduced through The Environment Act, which received its royal assent in November 2021. BNG is a way of making sure the habitat for wildlife is planned into new developments from the outset, leaving the environment in a better state than it was before development. Under the updated timetable developers in England will be required to deliver 10% "Biodiversity Net Gain" from January 2024 onwards when building new housing, industrial or commercial developments. By the end of November, the government have committed to publishing all guidance and plans to implement the BNG regulations.

## Record-breaking Temperatures

The start of July was the hottest week on record for the planet, according to the World Meteorological Organisation. The UN body said that temperatures were breaking records on land and in the oceans, with "potentially devastating impacts on ecosystems and the environment". The world's September temperatures were also the warmest on record for September, and further, broke the previous high by a huge margin, according to the EU climate service. In the UK specifically, September was the joint-warmest September on record, in a series which goes back to 1884, according to provisional Met Office statistics.

## Sustainable Transport

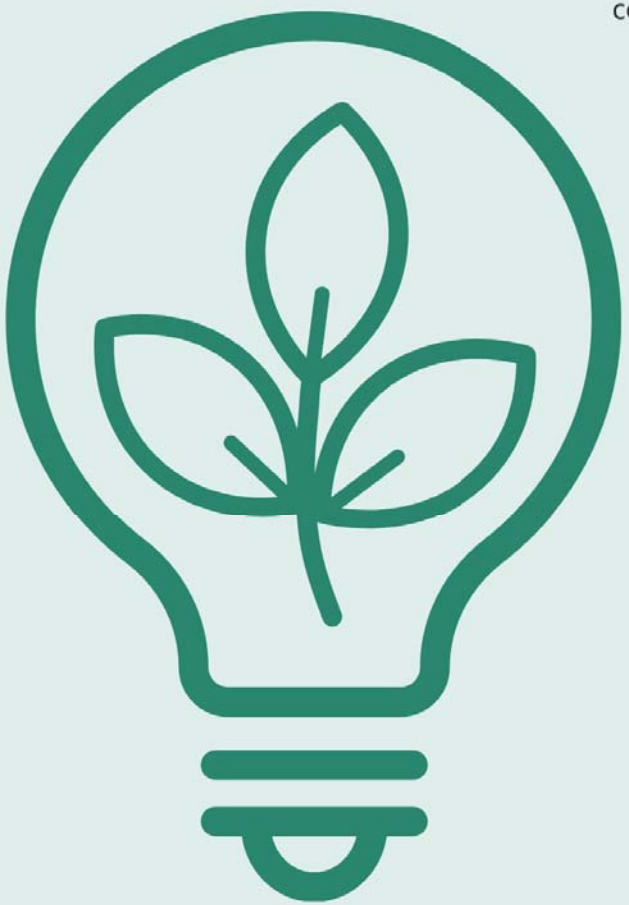
At the beginning of this quarter, HM Government announced plans to provide further funding so that bus operators can continue to cap single bus fares outside of London at £2, until the end of October. With the aim of encouraging people to use bus services, which are an important part of a sustainable travel model.

In July, Jaguar Land Rover-owner Tata confirmed plans to build its flagship electric car battery factory in the UK. The Society of Motor Manufacturers and Traders said that the investment had come at a critical time for the UK. "With the global industry transitioning at pace to electrification, producing batteries in the UK is essential if we are to anchor wider vehicle production here for the long term," said SMMT chief executive.

# Quarter two performance highlights

We successfully trialled an **electric food waste collection vehicle** and now plan to purchase our own

We hosted an **online forum** for town and parish councils and community groups about improving energy efficiency in community buildings



We published a guide for district, town and parish councils on the support and funding that is available in the district for **retrofitting** homes and community buildings

We approved a **new policy** on using Section 106 funds to deliver affordable housing, with a particular focus on using the funds for more sustainable schemes

We completed an energy efficiency and site decarbonisation **assessments** for all our leisure centres

**GOAL**

To make climate action inherent in all the council's work by designing and updating our policies, strategies and governance with the climate emergency at their core

# THEME 1 Our ways of working

See Theme 1 performance updates against all reporting measures on page 14

## QUARTER TWO — KEY ACTIVITIES

During this quarter, the delivery of staff training on the Procurement Strategy was completed. This training included content on understanding carbon reduction objectives and criterion and ensuring they form a part of procuring goods and services for the council.

Following the identification of a suitable product for monitoring the carbon emissions and impacts of procurement last quarter, this quarter, the internal consultation process was started to establish next steps and review its potential use.

Additionally, this quarter the updated policy on how Section 106 funds can be used to support the delivery of new affordable housing, was agreed by councillors and will be live from early October. Part of the new policy focused on how the Council encourages funds to be directed towards schemes that are more sustainable and consider carbon impacts. Increasing the energy efficiency of homes will also have the dual benefit of reducing costs for those that live in the homes, as well as reducing carbon emissions.

These actions are key to the progression of our aim to ensure the climate and environmental impact of our work is considered and embedded within our day-to-day activities and processes.

**GOAL**

To plan and deliver services to our residents in ways that reduce carbon emissions and prepare our district for future ways of living

# THEME 2 Our service delivery

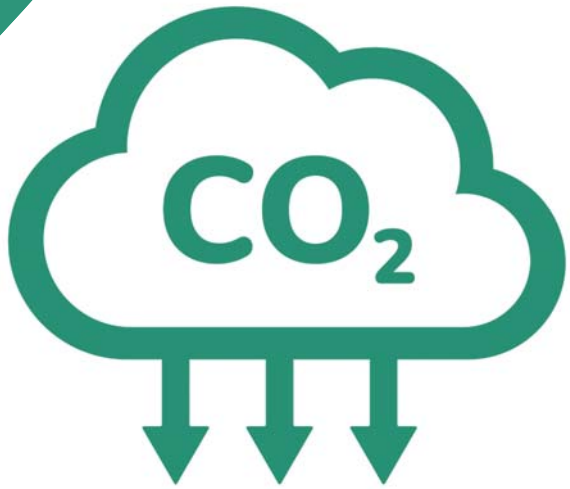
See Theme 2 performance updates against all reporting measures on page 21

## QUARTER TWO — KEY ACTIVITIES

This quarter, work continued on developing the strategic approach to our future waste services, in recognition that the waste collection service accounts for just over 35% of the council's greenhouse gas emissions.

Transition to electric vehicles (EVs) is a part of our journey to net zero. Following a successful trial this quarter of an electric food waste vehicle, it is intended to purchase one in line with the council's fleet replacement programme and associated timeline. Work also continued this quarter to understand the nature and condition of the waste fleet owned and operated by Biffa, to help inform further, future vehicle plans.

Officers have also been exploring the market to identify suitable EV providers that can meet the vehicle needs of specific service teams across the council. This quarter, the Development and Corporate Landlord service started the process to lease three EVs for the Parks and Cleaning teams. A trial of an electric van is also being arranged, to assess suitability for the Facilities team.



**GOAL**

To create a culture of climate action amongst staff and councillors in the workplace

# THEME 3 Our people

See Theme 3 performance updates against all reporting measures on page 24

## QUARTER TWO — KEY ACTIVITIES

This quarter, to support officers in preparing for upcoming planning reforms, including the Biodiversity Net Gain requirements, an application was submitted to the Planning Skills Delivery Fund for £89,050, in partnership with South Oxfordshire District Council. This application was for online and in-person training and will help upskill Planning and Planning Policy officers in respect of the reforms and continuing to put climate and biodiversity issues at the forefront of their work.

Moreover, this quarter through the council's regular staff communications, officers were encouraged to participate in, or learn more about, national climate action campaigns and initiatives. Including, Plastic Free July, Cycle to Work Day and Car Free Day as well as local opportunities such as becoming a tree guardian.

**GOAL**

To approach our land management with sustainable and climate-friendly best practices

# THEME 4 Our land

See Theme 4 performance updates against all reporting measures on page 26

## QUARTER TWO — KEY ACTIVITIES

The Council is committed to enhancing biodiversity on council owned land and this quarter, officers collated feedback on the 'Let it Bee' awareness campaign which ran over quarter one. Nine regularly mown sites across Abingdon, Faringdon and Wantage were identified as suitable sites to allow biodiversity to thrive by stopping cutting during the growing season, allowing wildflowers and grasses to grow and provide nectar for pollinators.

**GOAL**

To decarbonise our buildings and their operations to ensure they are fit for the future

# THEME 5 Our buildings

See Theme 5 performance updates against all reporting measures on page 28

## QUARTER TWO — KEY ACTIVITIES

This quarter, the decarbonisation surveys and assessments for all Vale of White Horse District Council's Leisure centres were completed. Additionally, the Beacon decarbonisation survey was received and reviewed by officers. At quarter two 2023/24, the project to deliver energy efficiency measures and new renewable energy generation at Faringdon Leisure Centre is near completion. The appointment of consultants to take forward decarbonisation works at White Horse Tennis and Leisure Centre and Wantage Leisure Centre is imminent and will progress throughout quarter three.

These projects are all significant in our journey to net zero.

**GOAL**

To guide and support the district's businesses, voluntary sector and communities to take action on the climate emergency

# THEME 6 Our communities

See Theme 6 performance updates against all reporting measures on page 32

## QUARTER TWO — KEY ACTIVITIES

In line with the council's aims to work with communities, businesses, the voluntary sector and residents to address the climate emergency, this quarter new webpages in the economic development section of the council's website were created, to support and encourage businesses to take climate action. Additional content was created on the circular economy and how businesses can make their online services more energy efficient.

This quarter the Climate and Biodiversity team hosted an online forum for town and parish councils and community groups about improving energy efficiency in community buildings. This forum included sharing case studies and having speakers from local community groups who have experience of delivering projects to install energy saving measures and renewable energy technologies, such as solar panels, on their community buildings.

In addition, a briefing on retrofitting homes and community buildings for district, town and parish councils which consolidates information on retrofitting support and financing, was published and promoted and all town and parish councils were contacted about a new Carbon Emissions Tool to help them record and monitor the carbon emissions of their own operations.

This quarter we promoted retrofitting and grants for energy saving home improvements through social media and newsletters. This included highlighting local events such as the Energy Saving Homes – Open Door event in Botley where residents could visit local properties and find out how their neighbours had retrofitted their homes to increase energy efficiency.

Additionally, work continued on engaging with communities preparing neighbourhood plans and helping them to incorporate climate measures.

**GOAL**

To work in partnership to reduce carbon emissions across the district and support county-wide initiatives, making a greater impact together

# THEME 7 Our partners

See Theme 7 performance updates against all reporting measures on page 37

## QUARTER TWO — KEY ACTIVITIES

The CAP aims to build on the council's partnership work as key to achieving our climate emergency targets and this quarter, Vale of White Horse District Council partnered in Oxford City Council's 'FutureFit Oxfordshire' funding bid to Innovate UK's Net Zero Pathfinder Places programme. The project will aim to create an enabling environment for retrofitting one stop shops (such as Cosy Homes Oxfordshire and Energy Solutions Oxfordshire) to thrive and scale up activity. The funding application was submitted in September, with a decision expected in quarter three. This project is in line with our aim to support the development of a coordinated retrofit programme across Oxfordshire.

During this quarter, the council also responded to Oxfordshire County Council's consultation on the Strategic Active Travel Network (SATN). The SATN consultation included an interactive map of proposed cycling and walking routes, and the Council provided feedback on what should be on the map, including for example commenting that Watchfield and Wantage were not suitably prioritised. This work is part of planning for an improved active and sustainable travel network across the district.

Officers have been involved in several partnership meetings supporting the enhancement of rivers and waterways this quarter, including, attending the first of the 'Reclaim our Rivers Advocacy Board' hosted by environmental charity, Thames21, with the aim of collaborative working to improve river health for people and wildlife.

The council aims to engage with partners across the energy sector on activity required to tackle the challenges of grid capacity and energy infrastructure and this quarter officers met with the new Energy Planning lead at Oxfordshire County Council to discuss how the Local Area Energy Planning (LAE Planning) process would work for Vale of White Horse District Council. An LAE Planning Executive Steering Board has been established, which met for the first time this quarter, with the council being represented by the Deputy CEO – Place. The day-to-day work of driving the LAE plans forward will be overseen by an Energy Planning Working Group, which includes Vale of White Horse District Council officers.

| Theme 1: Our ways of working - Performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| WOW1 | Update the Corporate Delivery Framework to include considerations for climate impact and carbon emissions | Report on the climate impact and carbon emission considerations included in the Corporate Delivery Framework providing examples | Short Term (1 year) | Cabinet Member for Corporate Services and Transformation | Head of Policy and Programmes | Action completed. | | |
| WOW2 | Implement internal governance to progress and monitor the Climate Action Plan | Update on the internal governance including its structure and approach to progressing and monitoring the Climate Action Plan | Short Term (1 year) | Cabinet Member for Corporate Services and Transformation | Head of Policy and Programmes | Action completed. | | |
| WOW3 | Publish an internal toolkit with guidance for staff on how to assess the climate implications of projects and proposals | Update on the content of the toolkit and examples of projects and proposal that have used learning from the toolkit for the climate implications section of reports | Short Term (1 year) | Cabinet Member for Corporate Services and Transformation | Head of Policy and Programmes | No progress to report Q2 2023/2024. Discussions are ongoing about how to incorporate the climate impact assessment tool into the project management process with the aim of launching the tool to staff in Q3. | | This action is slightly behind schedule. The aim is to launch the tool in Q3. |

| Theme 1: Our ways of working - Performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| WOW4 | Develop and implement measures for monitoring procurement contracts based on carbon emissions and climate action | Update on monitoring of procurement contracts based on carbon emissions and climate action, providing examples of relevant contracts | Medium Term (2 years) | Cabinet Member for Finance and Corporate Assets | Head of Finance | Following the identification of a suitable product for monitoring the carbon emissions and impacts of procurement contracts in Q1, this quarter, the GW1 was drafted to determine if the procurement can proceed. Once it is confirmed that the proposed solutioned complies with the councils' IT strategy, the GW1 will be sent to the Senior Management Team for their review. | | |
| WOW5 | Update the contract evaluation quality scoring procedure to include carbon reduction criteria | Report on how the contract evaluation quality scoring criteria has been updated to include carbon reduction criteria, providing examples of relevant awarded contracts | Short Term (1 year) | Cabinet Member for Finance and Corporate Assets | Head of Finance | Action completed. | | |
| WOW6 | Deliver staff training on the Procurement Strategy which includes understanding of carbon reduction objectives and criterion | Percentage of staff who completed the procurement training quarterly / report on how the training has impacted procurement contracts, providing relevant examples | Short Term (1 year) | Cabinet Member for Corporate Services and Transformation | Head of Finance | At Q2 2023/24, all training on the procurement strategy is now complete. Officers will gather some examples of where carbon reduction objectives have been included in procurements, for ongoing monitoring purposes. | | |
| WOW7 | Conduct a review of all report writing templates, adding a climate implications section where missing | Percentage of report writing templates that include a climate implications section / Narrative on the updates to report writing templates | Short Term (1 year) | Leader of the Council | Head of Legal and Democratic | Action completed. | | |

| Theme 1: Our ways of working - Performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| WOW8 | Divest direct investments from environmentally harmful activities where possible, whilst protecting the security of tax-payer funds | Narrative update on the introduction of the investment strategy and subsequent decision-making around investing | Short Term (1 year) | Cabinet Member for Finance and Property | Head of Finance | Action completed. | | |
| WOW9 | Incorporate a policy statement on environment/social/ governance factors in the financial implications section of reports | Update on the statement included in Council templates under financial implications | Short Term (1 year) | Cabinet Member for Finance and Property | Head of Finance | Action completed. | | |
| WOW10 | Engage with the council's investment portfolio to ask for and review their carbon reduction plans as part of decision making for the treasury management strategy | Number of investment portfolios reviewed for their carbon reduction plans / narrative on any changes in investments based on investment portfolio carbon reduction plans / percentage of Council portfolio in Paris Agreement aligned companies | Short Term (1 year) | Cabinet Member for Finance and Property | Head of Finance | Action completed. | | |
| WOW11 | Review internal audit processes and where appropriate include risk considerations for the climate emergency | Report on how the internal audit processes have been updated to include carbon emission considerations | Short Term (1 year) | Cabinet Member for Finance and Property | Head of Finance | Action completed. | | |

| Theme 1: Our ways of working - Performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| WOW12 | Refine criteria for community infrastructure levy (CIL) funding to maximise opportunities for including carbon reduction measures in projects and supporting climate action projects | Narrative update on CIL spend to support the delivery of local infrastructure<br><br>Quantitative elements - Total CIL spend and spend break down | Medium Term (2 years) | Cabinet Member Development and Infrastructure | Head of Policy and Programmes / Head of Finance | In Q2, progress updates were requested from the projects allocated CIL funding as set out in Q1 update.<br><br>Requests for projects seeking CIL funding for 2024/25 were received this quarter. Details on the number of requested projects that directly address the climate emergency will be reported in Q3, with confirmation of funding allocations due at budget setting in Q4. | | |
| WOW13 | Promote community infrastructure levy (CIL) criteria to all relevant staff to ensure they maximise carbon emission reductions in all CIL projects | Percentage of CIL projects that include carbon emission reduction considerations/ relevant project proposals, providing examples | Medium Term (2 years) | Cabinet Member Development and Infrastructure | Head of Policy and Programmes / Head of Finance | In Q2, projects seeking CIL funding were submitted and are currently being reviewed for consideration as to which of these may be put forward as recommendations as part of the budget setting process. The call out request for projects asked officers to ensure that climate emergency considerations formed part of the projects and reminded that the Climate and Biodiversity team are a statutory consultee on all council projects. Total number of climate related projects and approximate CIL allocation request will be provided as part of the Q3 update. | | |

| Theme 1: Our ways of working - Performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| WOW14 | Include more ambitious climate criteria in the conditions of our affordable housing grant funding | Updates on changes to the climate criteria of the affordable housing grant funding and how this has impacted new affordable housing developments, providing examples | Medium Term (2 years) | Cabinet Member Development and Infrastructure | Head of Housing and Environment | In Q2, an updated policy on how Section 106 funds can be used to support the delivery of new affordable housing was agreed by councillors and will be live from early October. Part of the new policy focused on how the Council encourages funds to be directed towards schemes that are more sustainable and consider carbon impacts. Increasing the energy efficiency of homes will also have the dual benefit of reducing costs for those that live in the homes, as well as reducing carbon emissions. | | |
| WOW15 | Include policies in the Joint Local Plan that will help deliver zero carbon development and encourage more sustainable choices | Narrative update on sustainable and net zero planning policies being developed and included in the emerging JLP | Long Term (2 years plus to deliver) | Cabinet Member Corporate Services and Transformation | Head of Policy and Programmes | In Q2 the Council's net zero carbon consultants Bioregional made substantial progress on the evidence base for the Joint Local Plan, providing analysis and recommendation to underpin new sustainable construction policies. | | |
| WOW16 | Produce an options paper for setting up a carbon offsetting scheme for developers as part of the new Joint Local Plan | Report on options paper development and suggested ways forward | Long Term (2 years plus to deliver) | Cabinet Member Development and Infrastructure | Head of Policy and Programmes | In Q2, consultants Bioregional, appointed to provide the net zero evidence base for the forthcoming Joint Local Plan, worked on advice on the role and weighting of offsetting policies in the Joint Local Plan in achieving net zero carbon status. | | |

| Theme 1: Our ways of working - Performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| WOW17 | Produce an options paper for pool electric vehicles for use by council staff to reduce emissions from business mileage, implementing if approved | Update on the development of options paper for piloting pool electric vehicles, including on the carbon emission savings and decision making progress | Medium Term (2 years) | Cabinet Member for Corporate Services and Transformation | Head of Policy and Programmes | In Q2, a draft options paper was written, which seeks to outline options for reducing the council's grey fleet emissions, including pool vehicles as one option to reduce these. The next step is for this paper to be refined and shared with the Head of Service for Policy and Programmes. | | |
| WOW18 | Develop and implement an internal communications plan to keep staff updated on climate action work, including useful advice and guidance on how to incorporate climate action into projects and programmes | Data on the number of internal communications campaigns on climate action work and a narrative update on the type of information shared and any feedback from staff on the use of the information | Short Term (1 year) | Cabinet Member Community Engagement | Head of Corporate Services | During Q2, through the 12 weekly staff email updates and regular Jarvis news items, staff were encouraged to take part in various climate action initatives and campaigns, including Plastic Free July, Cycle to Work Day and Car Free Day. In addition to being involved in local opportunities such as an electric vehicle charger survey, becoming a tree guardian and haymaking at Barton Fields. They were also kept informed about council climate action projects, including an electric food waste truck trial and the new countywide air quality website. | | |
| WOW19 | Move to a digital by default approach for virtual meetings where possible given the current conditions around decision making in Local Government | Percentage of virtual meetings taken place, benchmark to include CEAC, Scrutiny, Cabinet and Council meetings | Short Term (1 year) | Leader of the Council | Head of Legal and Democratic | Action completed. | | |
| WOW20 | Improve our use of existing technology to move to digital by default working | Update on the use of technology for meetings; data on percentage of MFD printing | Short Term (1 year) | Cabinet Member for Corporate Services and Transformation | Head of Corporate Services | Action completed. | | |

| Theme 1: Our ways of working - Performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| WOW21 | Develop and implement an anti-idling policy for staff and contractors on council business, to ensure engines are turned off when appropriate | Update on the development of the policy and examples of anti-idling implementation from staff and contractors | Medium Term (2 years) | Cabinet Member for Climate Action and the Environment | Head of Corporate Service | During Q2 a Driving at Work Policy was drafted. The next steps is for this to be subject to consultation with appropriate service teams and the council's recognised trades union in due course. | | |

| Theme 2: Our service delivery - performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| SD1 | a) Prepare new waste management approach to align with provisions of the Environment Bill | Narrative report to outline steps to influence partners and our actions to reduce overall waste | Long Term (2 years plus to deliver) | Cabinet Member for Climate Action and the Environment | Head of Housing and Environment | This quarter, work has continued on developing the strategic approach to future waste services to help inform preparations for the new waste contract, to be provided up to June 2026. | | RAG will remain Amber until contract issues are formally resolved. |
| SD2 | b) Specify new waste management contract with route optimisation, collection frequency and vehicle size to minimise carbon emissions | Narrative report to outline steps to influence partners and our actions to reduce overall waste | Long Term (2 years plus to deliver) | Cabinet Member for Climate Action and the Environment | Head of Housing and Environment | No further information available this quarter - changes to the waste contract are currently confidential. | | |
| SD3 | c) Trial electric refuse vehicles and other relevant vehicle options, to identify the most suitable vehicles for reducing carbon emissions whilst maintaining service delivery | Narrative report to outline steps to influence partners and our actions to reduce overall waste | Long Term (2 years plus to deliver) | Cabinet Member for Climate Action and the Environment | Head of Housing and Environment | Following a successful two week trial this quarter, of an electric food waste vehicle, it is proposed to purchase a vehicle as part of the fleet replacement programme. It is anticipated this would arrive spring/ summer 2024, pending final approval. | | |
| SD4 | d) Replace end of life waste collection vehicles with electric fleet where range available allows | Narrative report to outline steps to influence partners and our actions to reduce overall waste | Long Term (2 years plus to deliver) | Cabinet Member for Climate Action and the Environment | Head of Housing and Environment | In Q2, work continued to understand the nature and condition of the waste fleet owned and operated by Biffa. This work is ongoing and information is being used to help develop future vehicle plans. | | |

| Theme 2: Our service delivery - performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| SD5 | Explore opportunities for a new waste depot including research into renewable energy supplies | Update on proposals for a new waste depot, including potential carbon reduction figures | Long Term (2 years plus to deliver) | Cabinet Member for Climate Action and the Environment | Head of Housing and Environment | In Q2, work continued to investigate options for a new waste depot site. The council is in a non-disclosure agreement with a landowner regarding a potential site, so no further information is available at this time. | | Work will remain Amber until the Heads of Terms with the landowner are agreed and planning permission received for the new depot site. |
| SD6 | Develop a business case and implement a delivery plan for council vehicles to be zero emission by 2025, where available on the market | Data on potential carbon reduction savings from switching vehicles to zero emission; narrative report on business case development and delivery plan for doing so, including market options for EVs | Short Term (1 year) | Cabinet Member for Finance and Property | Head of Development and Corporatre Landlord | In Q2, the Development and Corporate Landlord service started the process of organising the lease of three electric vehicles for the parks and cleaning teams and is aiming for a minimum of four EVs within the service by January 2024. The Facilities team is arranging a trial of an electric van to assess suitability. | | This action is behind schedule and there is still no longer term delivery plan. |
| SD7 | Install electric vehicle (EV) charge points in council depot and other locations as necessary to meet needs of council fleet | Data on the number of EV charge points installed for use by council fleet; narrative update on the location of the EV charge points and how they meet the needs of the council fleet | Medium Term (2 years) | Cabinet Member for Finance and Property | Head of Development and Corporate Landlord | This quarter, officers have continued to review suitable sites for the grounds maintenance team. Work on this action will be ongoing over the next quarter and beyond. | | Work to continue next quarter with current work being made to find a suitable location. |

| Theme 2: Our service delivery - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| SD8 | Feedback on planning applications to include signposting to information sources to improve the energy efficiency of proposals | Data on the percentage of applications that include sign posting to energy efficiency advice | Short Term (1 year) | Cabinet Member Community Engagement | Head of Planning | Action completed. | | |
| SD9 | Update the council planning and development webpages to signpost to advice on energy efficiency considerations for inclusion in planning applications | Update on the energy efficiency information provided on the council webpages; data on the number of clicks on the links | Short Term (1 year) | Cabinet Member Community Engagement | Head of Planning | In Q2, the draft content was reviewed by the Planning team and comments returned to the Climate and Biodiversity team. The next steps are for a final draft to be worked up and agreed, prior to publishing the content. | | |
| SD10 | Work with our town and parish councils who are developing projects that reduce carbon emissions locally by providing advice on planning permissions needed for their projects to be a success | Report on support provided to town and parish councils on their carbon reduction projects; data on number of carbon emissions reduction projects submitted by town and parish councils | Short Term (1 year) | Cabinet Member Community Engagement | Head of Planning | In Q2, Town and Parish engagement sessions continued to be offered on a monthly basis. These sessions are promoted, but uptake remains slow. Town and Parish training sessions are being rolled out next quarter during October/ November, where we will continue to encourage town and parish councils to engage. | | |

| Theme 3: Our people - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| P1 | Provide all-staff and councillor training on the council's climate action plan and carbon literacy | Data on percentage of staff that have taken the climate action plan training; narrative on how staff have integrated the training into their work, using case studies | Short Term (1 year) | Cabinet Member for Corporate Services and Transformation | Head of Corporate Services | At the end of Q2, 66 users have completed the training equating to 12% of all Staff. Four members have completed the training equating to 5.5% of councillors for South and 5.2% of councillors for Vale. | | |
| P2 | Provide enhanced specialist training on latest carbon reduction or climate action approaches to relevant staff and councillors | Data on percentage of specialist training delivered to staff; narrative on how staff identify the training they need and how they have used the training in their work | Medium Term (2 years) | Cabinet Member for Corporate Services and Transformation | Head of Corporate Services / Head of Policy and Programmes | No progress to report Q2 2023/24 | | |
| P3 | Ensure there is relevant skill and capacity to support grant application writing and bidding for climate related funds, maximising the opportunities to include carbon emissions reductions and energy efficiency in all projects | Dedicated bid writing resource secured; Data on the number of applications to grants and funds that relate to climate action and carbon emission reduction; narrative report on grant writing skills and training that has taken place to maximise opportunities on bid writing | Long Term (2 years plus to deliver) | Cabinet Member for Corporate Services and Transformation | Head of Policy and Programmes | In Q2, an application was submitted to the Planning Skills Delivery Fund for £89,050 total (for South and Vale). This application was for online and in-person training to upskill the existing Planning and Planning Policy Teams, to cover identified skills gaps and to prepare for upcoming planning reforms. This includes the development of skills in preparation for Biodiversity Net Gain requirements in upcoming planning reforms.<br><br>Additionally this quarter, in collaboration with Oxfordshire County Council, work continued on developing the Local Electric Vehicle Infrastructure (LEVI) project application. | | |

| Theme 3: Our people - performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| P4 | Implement a green travel plan for all staff and councillors, including a digital by default approach where possible to reduce travel | Data on staff mileage once this plan is implemented and narrative report on the changes to staff travel as a result of the plan | Medium Term (2 years) | Cabinet Member for Corporate Services and Transformation | Head of Corporate Services | No progress to report for Q2 2023/2024.<br><br>Capturing information on the cost of staff travel quarter on quarter is ongoing and reported to SMT on a regular basis. This data will help inform a future travel plan. | | |
| P5 | Set up green champions network for interested staff to support climate work | Report on outcomes of green champion network meetings, including case studies of green champions to highlight key areas of work and impact of the champions | Short Term (1 year) | Cabinet Member for Corporate Services and Transformation | Head of Corporate Services | This action is now considered BAU, following agreement in Q1 2023/24 to refocus this action by widening employee engagement in climate action and biodiversity, with the aim to embed a 'green' culture amongst all staff across the council. This will be achieved by utilising existing communication channels and linking into existing work streams to create opportunities for behavioural change in our ways of working. See WOW18 for details on internal communications to staff during Q2 2023/24. In addition, the results from the council's staff wellbeing survey were published in Q2, with 70% of respondents saying they would be interested in hearing more about Climate/Nature activities. | | |
| P6 | Incorporate climate action opportunities within council volunteering scheme for staff | Data on the number of climate action opportunities within council volunteering scheme and data on the number of take up of these opportunities; case studies from staff on how they have engaged with this opportunity | Medium Term (2 years) | Cabinet Member for Corporate Services and Transformation | Head of Corporate Services | Action completed. | | |

| Theme 4: Our land - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| L1 | Following the grounds maintenance operational review, update grounds maintenance operations to enhance biodiversity and tree cover including considering the need for mowing, opportunities to allow for wilding, and reducing the use of pesticides and herbicides where possible | Report sharing the updates to the grounds maintenance operations that address the climate emergency and how they support biodiversity | Short Term (1 year) | Cabinet Member Finance and Property | Head of Development and Corporate Landlord | The GM review by Transformation team is still in progress. In Q2 Transformation team have been benchmarking the service, looking at process maps and KPIs to decide the next stage of the process.<br><br>This year we have been trialling different nature-friendly approaches to the maintenance of council-owned land. Nine sites were identified in Vale/Eight sites were identified in South where we chose not to mow over the summer to enhance biodiversity and encourage wildflowers. In Q2 we collated feedback on the 'Let it Bee' campaign, and in Q3 we will be sending letters to residents to get comments on specific sites. | | |
| L2 | Identify sites for new tree planting and wilding opportunities on Our land or through partnership opportunities on privately owned land to support natural carbon capture | Report on identification of sites for new tree planting opportunities, including plans to plant trees on these sites | Medium Term (2 years) | Cabinet Member for Finance and Property | Head of Development and Corporate Landlord | No progress to report for Q2 2023/2024. | | |
| L3 | Prepare a business case and, if approved, implement a local renewable energy project, such as a solar farm, to address unavoidable council emissions | Data on the amount of renewable energy produced and emissions offset; Narrative update on the progression of plans for this project and how the renewable energy produced neutralises council emissions | Long Term (2 years plus to deliver) | Cabinet Member for Finance and Property | Head of Development and Corporate Landlord | In Q2, officers reviewed the report from advisors APSE, which provided commentary and a feasibility assessment of 4 sites across Vale on their suitability for use as a solar farm. Officers have been preparing to bring forward a report on the findings and next steps to advance the project on the most suitable site or sites. | | |

| Theme 4: Our land - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| L4 | Deliver the Park and Charge scheme, installing EV charge points in our car parks, in partnership with Oxfordshire County Council | Data on the number of EV charge points installed in council car parks; narrative update on the partnership approach for delivering this project | Short Term (1 year) | Cabinet Member for Finance and Property | Head of Development and Corporate Landlord | Action completed. | | |
| L5 | Develop an options paper for installing public EV charging points on additional council premises, including funding sources available | Update on the business case development for installing public EV charging points; data on energy use of the points, including how much charge they provide to EVs | Medium Term (2 years) | Cabinet Member for Finance and Property | Head of Development and Corporate Landlord | In Q2, officers continued to collaborate with Oxfordshire County Council (OCC) on Oxfordshire's Local Electric Vehicle Infrastructure (LEVI) funding allocation of £3.655m capital and £500k revenue. Officers are working with OCC on how and where the grant will be spent by end of 2025. Officers will now be bringing a report to Cabinet in Q3 (November) to outline the proposals and how South and Vale's allocation will be spent. | | |

| Theme 5: Our buildings - performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| B1 | a) Complete energy efficiency and site decarbonisation assessments for all leisure centres | Data on the energy efficiency of all leisure centres; narrative report on site decarbonisation assessments, with projections for how the sites will be decarbonised | Medium Term (2 years) | Cabinet Member for Finance and Property | Head of Development and Corporate Landlord | In Q2, the evaluation report for Abbey Meadow pool was completed. This action is now complete. | | |
| B1 | b) Following site assessments of leisure centres, prepare for external funding opportunities, including soft market testing | Narrative update as to current initiatives to increase external funding for Council activities, with details of additional resources committed to support these activities<br><br>Specific elements which should be included - proportion of spend on leisure/ community facilities vs amount funded by Council; externally funded Capital schemes; total external funding received figure | Medium Term (2 years) | Cabinet Member for Finance and Property | Head of Development and Corporate Landlord | In Q2, project delivery at Faringdon Leisure Centre is near completion (awaiting District Network Operator connection) At White Horse Tennis and Leisure Centre and Wantage Leisure Centre funding has been secured for decarbonisation schemes and the appointment of consultant to enable progression is imminent. The survey for Abbey Meadows pool has been completed and an initial review was undertaken. The site does not qualify for a Public Sector Decarbonisation Scheme bid and at present the carbon benefits of major works are minimal so there are no proposals to undertake works at this time. | | |

| Theme 5: Our buildings - performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| B2 | a) Complete energy efficiency and site decarbonisation assessments for all non-leisure operational properties | Data on the energy efficiency of all non-leisure centres; Narrative report on site decarbonisation assessments, with projections for how the sites will be decarbonised | Long Term (2 years plus to deliver) | Cabinet Member for Finance and Property | Head of Development and Corporate Landlord | In Q2, the Beacon decarbonisation survey report was received and assessed for a Public Sector Decarbonisation Scheme bid. Surveys were also undertaken on district centres. Further phase 2 surveys will be considered in Q3. | | |
| B2 | b) Prepare for external funding opportunities for non-leisure properties, particularly properties with an end-of-use heating plant, including carrying out soft market testing | Narrative update as to current initiatives to increase external funding for Council activities, with details of additional resources committed to support these activities<br><br>Specific elements which should be included - proportion of spend on leisure/ community facilities vs amount funded by Council; externally funded Capital schemes; total external funding received figure | Long Term (2 years plus to deliver) | Cabinet Member for Finance and Property | Head of Development and Corporate Landlord | In Q2 the decision was made not to submit a Public Sector Decarbonisation Scheme bid for the Beacon, as the available fund would be a low percentage of the overall project cost, and there is not available CIL or other funding at this time to fund the rest. A further review of carbon requirements will be considered after the Arts centre review paper has been considered. | | |

| Theme 5: Our buildings - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| B3 | Include carbon and energy reduction targets in management plans for the monitoring of site operations including all leisure centres to enforce and encourage low carbon operational behaviour in council assets | Report on the changes to the carbon and energy reduction targets in the criteria for monitoring operations and report on the changes to operational procedures to meet carbon and energy reduction targets; data on carbon emissions from operations | Long Term (2 years plus to deliver) | Cabinet Member Development and Infrastructure | Head of Development and Corporate Landlord | Detailed monitoring information is available for the Leisure Centres and reviewed regularly.<br><br>Meter readings and data gathering has been reviewed for other buildings. Resource requirements for reporting and monitoring regime to be reviewed and developed.<br><br>Leisure centres – the day-to-day operation of the Leisure centres is in the hands of GLL. Their utility consumption reporting is reviewed every month by Council officers as part of monthly management meeting, and if any disparities are noted then these are discussed. Example issue raised with GLL was slowing the circulation pumps of pool water overnight , which has delivered notable energy saving.<br>Officers have identified significant number of proactive capital improvement projects over the last 18 months and have delivered LED lighting, pump inverter drive improvement, destratification fans. All these initiatives have been monitored through regular monthly gas and electric usage to quantify their effect.<br><br>Abbey House – historic utility usage has been collated to show any trend. Ongoing data is now reviewed by management on a monthly basis, and the utility bills checked against regular meter readings<br><br>(update continues on next page) | | |

| Theme 5: Our buildings - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| B3 | Include carbon and energy reduction targets in management plans for the monitoring of site operations including all leisure centres to enforce and encourage low carbon operational behaviour in council assets | Report on the changes to the carbon and energy reduction targets in the criteria for monitoring operations and report on the changes to operational procedures to meet carbon and energy reduction targets; data on carbon emissions from operations | Long Term (2 years plus to deliver) | Cabinet Member Development and Infrastructure | Head of Development and Corporate Landlord | As part of regular team meetings energy issues are considered. Recent initiatives include putting time clocks on teapoint water boilers, complete review of heating and mechanical systems operating hours as part of full replacement of Building Management System in early 2023, new LED lighting throughout ground floor area on sensor control in 2022, working with Climate action team to design labels for desks to remind staff to turn off monitors and power supplies at end of day.<br><br>Beacon - historic utility usage has been collated to show any trend. Ongoing data is now reviewed by management on a monthly basis, and the utility bills checked against regular meter readings. As part of regular team meetings energy issues are consider. Recent initiatives in 2023 include, relocation of the Building Management System computer from the plantroom to the managers office, so that better and regular control of the heating and mechanical systems operational hours can be made. | | |
| B4 | Develop a policy to agree an energy efficiency standard for new asset acquisitions and council owned builds | Update on the development of the energy efficiency standards policy for new asset acquisitions and builds, including case studies of how this has been implemented | Long Term (2 years plus to deliver) | Cabinet Member for Finance and Property | Head of Development and Corporate Landlord | In Q2, an SMT paper was drafted to take forward an approach to new asset acquisitions and builds. | | |

| Theme 6: Our communities - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| C1 | Implement an external communications plan which shares updates on the climate action work undertaken by the council, and advice and guidance to residents, businesses and the voluntary and community sector on reducing carbon emissions. To include: | Narrative update on comms and engagement activities which interface with communities, schools and other local organisations | Short Term (1 year) | Cabinet Member Community Engagement | Head of Corporate Services | In Q2, the Vale ran many successful climate campaigns as part of the communications campaign, including updating on the council's climate action work and encouraging behaviour change around tackling climate change. Some specific examples are: marking Plastic Free July and encouraging residents to take part; promoting electric vehicle use by contributing to a county wide press release highlighting offers for EV charging and car clubs available around World EV Day (9 September); working with the planning team to set up new pages on whether planning permission is needed to install retrofitting measures in homes (this is awaiting final sign off from planning); and continuing to promote the Climate Action Oxfordshire website, especially their articles on the energy saving benefits of insulating properties. | | |
| C2 | Advice and guidance on circular economy principles and how to implement them, especially for businesses and the voluntary and community sector | Narrative update on comms and engagement activities which interface with communities, schools and other local organisations | Long Term (2 years plus to deliver) | Cabinet Member Community Engagement | Head of Corporate Services | In Q2, the communications team continued to support and promote the work of the economic development team. New web pages in the economic development section of the website were created to support businesses to take climate action. Additional ontent was created on the circular economy and how businesses can make their online services more energy efficient. | | |

| Theme 6: Our communities - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| C3 | Advice and guidance on energy efficiency of operations, including consideration for delivery options and the energy efficiency of buildings used by businesses and the voluntary and community sector | Narrative update on comms and engagement activities which interface with communities, schools and other local organisations | Long Term (2 years plus to deliver) | Cabinet Member Community Engagement | Head of Corporate Services | In Q2, we continued to promote retrofitting and energy saving among businesses as well as offering step-by-step advice on retrofitting with new pages added to the climate section of the council's website. | | |
| C4 | Share climate friendly lifestyle changes, including ways to make homes more energy efficient | Narrative update on comms and engagement activities which interface with communities, schools and other local organisations | Long Term (2 years plus to deliver) | Cabinet Member Community Engagement | Head of Corporate Services | In Q2, we continued to promote retrofitting and grants for energy saving home improvements through social media and newsletters. This included highlighting local events such as the Energy Saving Homes - Open Doors event in Botley. | | |
| C5 | Promote climate funding opportunities for businesses, voluntary and community sectors, and residents | Narrative update on comms and engagement activities which interface with communities, schools and other local organisations | Long Term (2 years plus to deliver) | Cabinet Member Community Engagement | Head of Corporate Services | In Q2 a new webpage on 'Where to get funding for your communiity climate action project' was created, aimed at community groups and town and parish councils. This highlights seven different funding opportunties, including the Climate Action Fund. | | |
| C6 | Promote community sharing and reuse to reduce waste and unnecessary consumption | Narrative update on comms and engagement activities which interface with communities, schools and other local organisations | Long Term (2 years plus to deliver) | Cabinet Member Community Engagement | Head of Corporate Services | In Q2, we promoted Second Hand September and Zero Waste Week, linking to community action groups, repair cafes, refill shops and the benefits of composting. | | |

| Theme 6: Our communities - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| C7 | Promote relevant housing energy efficiency schemes, including grants, to residents, landlords and housing associations | Narrative update on comms and engagement activities which interface with communities, schools and other local organisations | Long Term (2 years plus to deliver) | Cabinet Member Community Engagement | Head of Corporate Services | In Q2, we continued to promote the energy saving loans and grants that are available to residents, using the loans and grants to improve your home page. | | |
| C8 | Include in Community Employment Plans considerations for addressing the councils climate neutral targets through commitments such as green skills training, sourcing through a local and sustainable supply chain, supporting local social enterprises and charities and accessing local employment | Update on the conditions of Community Employment Plans that address the climate emergency and how they are being implemented by developers; data on the number of Community Employment Plans implemented with conditions that address the climate emergency | Long Term (2 years plus to deliver) | Cabinet Member Community Engagement | Head of Development and Corporate Landlord | In Q2, the Economic Development team explored the opportunities to link UK Shared Prosperity Fund Green Skills funding with Community Employment Plans by offering retraining and upskilling courses to both trades and new entrants (new entrants would be offered wraparound support). Procurement opportunities will follow in 2024, enabling local training providers to bid to provide green skills courses related to construction and retrofit, and wraparound support for new entrants.<br><br>Our UK Shared Prosperity Fund commissioned study UNDERSTANDING THE NET ZERO CHALLENGE FOR SME'S IN SOUTH OXFORDSHIRE AND VALE OF WHITE HORSE should help us to address issues of local business sustainability, this can be linked to CEPs and building sustainable local supply chains. | | Current CEP policy is not explicitly aligned with climate outcomes, but opportunities exist to ensure CEP related training opportunities (inc. apprenticeships) can access appropriate green skills training in the local area. Whilst local supply chains should be climate positive, additional support is needed to ensure local businesses are able to decarbonise and operate in an environmentally sustainable manner. |

| Theme 6: Our communities - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| C9 | Support communities with their neighbourhood planning by providing up-to-date advice and guidance on climate measures and actions, encouraging climate considerations to be at the core of neighbourhood plans | Data on the number of neighbourhood plans developed; Narrative update on the types of climate actions incorporated into neighbourhood plans | Long Term (2 years plus to deliver) | Cabinet Member for Corporate Services and Transformation | Head of Policy and Programmes | In Q2 work continued to assist communities preparing neighbourhood plans, including encouraging the insertion of climate measures. There are 8 neighbourhood plans (including 1 plan review) currently being prepared. In Q2 the neighbourhood plans for East Hanney and Sutton Courtenay have reached the examination stage. The council has formally commented on these plans and where appropriate provided encouragement and advice on the refinement of policies addressing the challenges of climate change. | | |
| C10 | Support taxi drivers in switching to electric vehicles, including reviewing options to incentivise the switch through fees and charges | Data on the number of taxi drivers driving electric vehicles and narrative update on the support to taxi drivers for doing so | Long Term (2 years plus to deliver) | Cabinet Member for Community Health and Wellbeing | Head of Legal and Democratic | At Q2, out of 344 licensed vehicles there is 1 electric vehicle, although 127 are hybrid (37%). The council offers substantial discounts in licence fees for zero emission vehicles. | | We continue to promote the reduced fees for zero emission vehicles and an aim within the taxi policy is for all licensed vehicles to be zero carbon by 2030 at the latest. However, this will be constrained by the available infrastructure and in particular the ability for fast charging given the nature of the trade. |

| Theme 6: Our communities - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| C11 | Organise quarterly climate focused network meetings for town and parish councils, and voluntary and community organisations, linking with existing networks | Data on number of meetings held; narrative update on the agendas, outcomes and actions from the meetings | Long Term (2 years plus to deliver) | Cabinet Member Community Engagement | Head of Corporate Services | In Q2, the Climate and Biodiversity team hosted an online forum for town and parish councils and community groups about improving energy efficiency in community buildings. This took place on 11 July and over 40 people registered to attend. A recording of the event is available on the retrofitting community buildings page of the council website. | | |

| Theme 7: Our partners - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| OP1 | Build relationships with town and parish councils to support and encourage their climate action initiatives | Update on how the council has worked with town and parish councils on climate action initiatives, including case studies | Long Term (2 years plus to deliver) | Cabinet Member Community Engagement | Head of Policy and Programmes | During Q2, a briefing on retrofitting homes and community buildings for district, town and parish councils which consolidates information on retrofitting support and financing services was published and promoted. In July the council hosted an online forum for town and parish councils and community groups on how to retrofit community buildings, where the support that the councils can offer and the grants that are available were promoted.<br><br>All town and parish councils were contacted about a new free carbon emissions calculator tool that the council can supply them with to measure their current carbon emissions.<br><br>The Climate and Biodiversity team worked with Tree Opportunity Officers at Oxfordshire County Council to develop a new service for communities to develop tree planting projects. An expression of interest for this was launched in September. | | |
| OP2 | Identify areas in our community that are most vulnerable to the effects of climate change to ensure they are properly supported and protected to promote wider community wellbeing | Update on the identification of areas most vulnerable to the effects of climate change and how the council has supported them to adapt to these changes, including through initiatives such as Better Housing Better Health | Long Term (2 years plus to deliver) | Cabinet Member Corporate Services and Transformation | Head of Policy and Programmes | During Q2, officers continued to be involved in the stakeholder group for developing a climate adaptation evidence base for Oxfordshire, the report of which was produced in Q2 and is due to be finalised and published in Q3. | | |

| Theme 7: Our partners - performance updates against reporting measures | | | | | | | | |
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| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| OP3 | Work with Oxfordshire County Council to support active and sustainable travel infrastructure initiatives | Narrative update on progress toward completion of map, once map completed, this should transition to an annual review of the accuracy of map | Short Term (1 year) | Cabinet Member Corporate Services and Transformation | Head of Policy and Programmes | During Q2 the Council responded to Oxfordshire County Council's consultation on the Strategic Active Travel Network (SATN), the response is available here: https://www.whitehorsedc.gov.uk/wp-content/uploads/sites/3/2023/08/Vale-Letter-SATN-2-04.08.23_Redacted.pdf. The SATN consultation included an interactive map of proposed cycling and walking routes, and the Council provided feedback on what should be on the map, including for example commenting that Watchfield and Wantage were not suitably prioritised. This work is part of planning for an improved active and sustainable travel network. | | |
| OP4 | Work with the Future Oxfordshire Partnership on a county-wide approach to reducing carbon emissions, building on the strategic vision and Pathways to Zero Carbon Oxfordshire | Update on progress on the Future Oxfordshire Partnership's county-wide approach to reducing carbon emissions, including examples of projects and programmes that address the strategic vision and Pathways to Zero Carbon Oxfordshire | Short Term (1 year) | Cabinet Member for Strategic Partnerships and Place | Head of Policy and Programmes | In Q2, work continued to operationalise the five prioritised action areas of the Oxfordshire Net Zero Route Map and Action Plan. This work is now considered business as usual and progress on each Oxfordshire Net Zero Map action will continue to be reported thematically under the relevant CAP action in this report. | | |

| Theme 7: Our partners - performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| OP5 | With Our partners, support the development of a coordinated retrofit programme for Oxfordshire through our role in the Environmental Advisory Group of the Future Oxfordshire Partnership | Narrative report on work influencing work, comms activity and direct engagement with residents. | Long Term (2 years plus to deliver) | Cabinet Member Strategic Partnerships and Place | Head of Policy and Programmes | In Q2, both South and Vale councils were invited to be partners in Oxford City Council's FutureFit Oxfordshire funding bid to Innovate UK's Net Zero Pathfinder Places programme. The project will aim to create an enabling environment for retrofitting one stop shops (such as Cosy Homes Oxfordshire and Energy Solutions Oxfordshire) to thrive and scale up activity. The funding application was submitted in September, with a decision expected in Q3.<br><br>A briefing on retrofitting homes and community buildings for district, town and parish councils which consolidates information on retrofitting support and financing services was published and promoted. In July the council hosted an online forum for town and parish councils and community groups on how to retrofit community buildings, where the support that the councils can offer and the grants that are available were promoted.<br><br>Funding for retrofitting remains available to eligible residents within Vale of White Horse through Oxfordshire County Council's Home Upgrade Grant. | | |
| OP6 | Support Registered Social Landlords in applying for retrofit funding, such as Social Housing Decarbonisation Funding | Narrative update on engagement with Registered Social Landlords on retrofit funding | Long Term (2 years plus to deliver) | Cabinet Member for Community Health and Wellbeing | Head of Housing and Environment | No progress to report for Q2 2023/2024. | | |

| Theme 7: Our partners - performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| OP7 | Use our membership of Oxfordshire Local Enterprise Partnership (OxLEP) to ensure rapid growth of the green economy | Update on the council's influence in OxLEP to ensure rapid growth of the green economy, including examples of projects and programmes that address this work | Long Term (2 years plus to deliver) | Cabinet Member for Strategic Partnerships and Place | Head of Development and Corporate Landlord | In Q2, the Economic Development team continued to ensure that Vale's views have been feed into local strategic documents, including the refresh of the Strategic Economic Plan (SEP) and Destination Management Plan (DMP), emphasising that the principles of "good growth" defined in Oxfordshire's Strategic Vision for Long Term Sustainable Development are enshrined within plans.<br><br>Our plans to advance UKSPF backed interventions to develop Green Skills and support for decarbonisation whilst growing the economy have engaged with OxLEP and other regional partners, with a view to funding projects and programmes in 2024/25. | | |
| OP8 | Support and influence the Oxfordshire Plan 2050 ensuring climate considerations are integrated throughout the plan | Narrative report on work to support the Oxfordshire Plan in accordance with TCE3.7 | Medium Term (2 years) | Cabinet Member for Strategic Partnerships and Place | Head of Policy and Programmes | Work on OP2050 has ceased and this action will not be updated. | | |
| OP9 | Utilise the opportunity of the Oxford to Cambridge Arc to advance corporate objectives around the Climate Emergency | Narrative update on the work of the Oxford-Cambridge arc and our influencing activity | Long Term (2 years plus to deliver) | Cabinet Member for Strategic Partnerships and Place | Head of Policy and Programmes | The council has taken the decision to no longer engage with the Oxford to Cambridge Arc (now known as the Oxford-Cambridge Partnership). | | |

| Theme 7: Our partners - performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| OP10 | Support the Thames Valley Rivers network to meet their aims and use this group to facilitate and influence work cross party and cross boundary to end pollution in the river and promote the sustainable use and enjoyment of the River Thames | Update on work with the Thames Valley Rivers network, including case studies of projects and programmes that have been implemented to meet the aims of the network | Short Term (1 year) | Cabinet Member for Climate Action and the Environment | Head of Policy and Programmes | In Q2, officers have been involved in several partnership meetings supporting the enhancement of rivers and waterways. Including, attending the first of the 'Reclaim our Rivers Advocacy Board' hosted by environmental charity, Thames21, with the aim of collaborative working to improve river health for people and wildlife.<br><br>Climate and Biodiversity officers also contributed positively to advising on reducing surface water run off at Portway Car Park, Wantage and Cattle Market Car Park, Abingdon. Reducing surface water run-off from council property reduces the amount of water entering the sewage treatment process and in turn reduces demand on the system, helping to contribute to reducing sewage overspills. | | |
| OP11 | Engagement across the energy sector on activity required to move to carbon neutral and work with them to tackle the challenge of grid capacity, time of day demand and energy infrastructure | Update on engagement with the energy sector and examples of work with them to tackle the challenge of grid capacity, time of day demand and energy infrastructure | Medium Term (2 years) | Cabinet Member Corporate Services and Transformation | Head of Policy and Programmes | In Q2 2023/24 Officers met with the new Energy Planning lead at Oxfordshire County Council to discuss how the Local Area Energy Planning (LAE Planning) process would work for the council. The governance structure has now been established and an Executive Steering Board established, which met for the first time on 13 September, the council is represented by the Deputy CEO – Place. The day-to-day work of driving the LAE plans forward will be overseen by an Energy Planning Working Group which includes officers from the council. | | |

| Theme 7: Our partners - performance updates against reporting measures | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **CAP ID** | **Actions** | **Reporting Measure** | **Delivery Timescale** | **Cabinet Lead** | **Officer Lead** | **Performance Update** | **RAG rate progress against each measure** | **Comments on AMBER or RED ratings** |
| OP12 | Partner with Good Food Oxfordshire to support their Good Food Strategy for Oxfordshire, ensuring climate considerations are included throughout the strategy | Update on the development of the Good Food Strategy for Oxfordshire, including examples of climate considerations | Medium Term (2 years) | Cabinet Member Corporate Services and Transformation | Head of Policy and Programmes | In Q2, the first meetin of the Joint South and Vale Food Action Steering Group met on 5 September 2023 and agreed themes to review of education, health and wellbeing, planning, economic development and careers and institutional contracts. | | |

Vale of White Horse District Council

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**Policy and Programmes**

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**Appendix CL2.25**

**Climate Action Plan for South Oxfordshire District Council 2022-2024**

# Climate Action Plan

for South Oxfordshire District Council

## 2022-2024

South Oxfordshire District Council

# Foreword

Welcome to our Climate Action Plan for 2022-2024. This Plan outlines how we as a council will reduce our carbon emissions to reach our target of being a carbon neutral council by 2025. What does this mean? It involves reviewing our services and ways of working to ensure climate is embedded throughout all our areas of work. It means staff receiving training to have the skills and knowledge they need to integrate climate considerations into the core of their work. It also means preparing for the future by reviewing our buildings and land to ensure we use best practice in their maintenance and upkeep. Finally, it involves working with our communities, including businesses, the voluntary sector and residents, and our key partners to make an impact across the district and county.

This Plan is a specific commitment in our Corporate Plan 2020-24. During the engagement on our Corporate Plan, residents told us that the Climate Emergency was really important to them so we decided that Action on the Climate Emergency needed to be at the core of our Corporate Plan, and embedded throughout the Corporate Plan's other themes.

We wrote the Climate Action Plan 18 months into the Covid-19 pandemic, which has greatly impacted the lives of all around the world. It has caused us to all live and work differently, including working from home for many council staff and residents. Whilst this time has been extremely challenging and difficult, it has had some positive impacts on our environment and climate action. This includes reduced travel and a greater appreciation for our surroundings, including our local shops our green space, and the natural environment.

While this is the first publication of our Climate Action Plan, work to address climate change has been happening in the district for decades, especially from our committed community groups and residents. We are so pleased to have such a strong voluntary sector that are making strides in tackling the climate emergency locally and leading by example. We will continue to support and hope to strengthen our relationship with local climate action groups and residents going forward, while focusing on how we address the council's own emissions. We also look forward to working together with our neighbouring councils to address wider district emissions in partnership.

We must also remember that by taking action locally, we are making a positive contribution to this global issue. COP26 recently provided us with a stark reminder of the work that needs to be done to ensure our planet is liveable for future generations, so there is no better time to publish our Climate Action Plan.

**Cllr David Rouane**
**Leader of South Oxfordshire District Council**

**Cllr. Sam Casey-Rerhaye**
**Chair of the Climate and Ecological Emergencies Advisory Committee (CEEAC)**

**Cllr Sue Cooper**
**Cabinet Member for Environment, Climate Change and Nature Recovery**

# Welcome from Simon Hewings, Head of Finance, South Oxfordshire District Council

This Climate Action Plan comes at an interesting time for us – with council budgets more constrained than ever, especially in the midst of the Covid-19 pandemic, addressing the climate emergency will be a challenge. As a council we continue to focus on providing core services for our residents as well as the wellbeing and resilience of our communities, our economic prosperity, and now taking climate action.

While financial implications are at the core of our decision making, climate considerations are now also a key focus to ensure we reach our carbon neutral targets. All our report writing templates will include a climate implications section to ensure we have considered the environmental impact of our work.

This Plan has been written in collaboration with colleagues across the council to ensure that the actions are honest, feasible and realistic, while also pushing us to make changes and improvements to our services. I have reviewed the actions and believe that through the skills and experience of our staff, working in partnership, lobbying government, and seeking external funding, we will be able to make an impact locally on this global issue.

We will continue to be open and accountable in all areas of work, this will also apply to how we monitor the progress of our Climate Action Plan and being upfront about any challenges we face. The Plan will be monitored closely by officers and councillors to ensure we are on track to meet our carbon neutral targets.

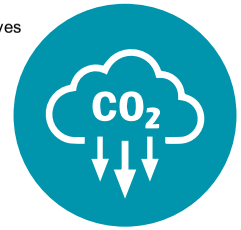
# Introduction

The purpose of this Climate Action Plan is to outline how South Oxfordshire District Council will meet its target of becoming a carbon neutral council by 2025. This plan focuses on the council's own emissions to ensure our operations and service provision are carbon neutral by our target date, leading by example before focusing on our district target to be carbon neutral by 2030.

This Plan presents a set of actions that will help us achieve our target of carbon neutrality through direct initiatives using our statutory powers, strategic policymaking, or by enabling behaviours and working with others. Our vision is for climate action to be embedded throughout all our ways of working and services, to support our communities to do the same, and to work in partnership to make a greater impact on our target.

This Plan first provides policy context to set the scene for climate action globally, nationally and locally, including our climate actions so far, followed by an outline of our strategic approach to climate action, our reporting methods and then our action plan.

**Carbon neutral,**
*or 'net zero carbon', means there is a balance between the carbon emissions released into the atmosphere and the amount of carbon emissions removed from the atmosphere.*



# Policy Context

There are a range of global, national, regional and local policies setting guidance and targets for taking climate action.

Internationally, the United Nations Framework Convention on Climate Change (UNFCCC) is the United Nations entity responsible for responding to climate change, and oversees the implementation of the Paris Agreement. The Paris Agreement is a legally binding international treaty on climate change which aims to limit the global temperature increase in this century to 2 degrees Celsius, preferably to 1.5 degrees Celsius, above preindustrial levels. It is a landmark treaty as it was adopted by 196 Parties, including the UK, at COP21 in Paris in 2015, bringing nations together to tackle climate change. At COP26 in 2021, the Glasgow Climate Pact urged for more urgent action and financing to meet the goals of the Paris Agreement Along with this agreement, the UN adopted the Sustainable Development Goals (SDGs) in 2015 which are a global urgent call to action to achieve a better and more sustainable future for all by 2030. Climate change is embedded throughout the goals, and is specifically addressed in goal 13, take urgent action to combat climate change and its impacts.

Nationally, the Climate Change Act 2008, updated in 2019, commits the UK to a 100 per cent reduction in carbon emissions, or net-zero, by 2050. The Act also resulted in the formation of the Committee on Climate Change (CCC) which is an advisory committee to the government on climate. In 2021 the Government published its Net Zero Strategy: Build Back Greener which outlines how the UK will manage its carbon budgets and sets out the UK's vision for a decarbonised economy by 2050. The Environment Act 2021 sets legislation to protect and enhance our environment, including policies around waste and recycling, air quality and water resources.

Regionally, the Pathways to zero carbon Oxfordshire (Pazco) report was published in 2021 to address how Oxfordshire can achieve net-zero emissions by 2050. There are also policy documents on specific sectors including the Oxfordshire Energy Strategy, which outlines how the county will be at the forefront of energy innovation to foster clean growth to reduce countywide emissions by 50 per cent by 2030 (compared to 2008 levels) and set a pathway to achieve zero carbon growth by 2050, and the Oxfordshire Plan 2050 which outlines how new homes and infrastructure will be developed across the county while helping to tackle climate change. As a council, we have also signed up to One Planet Oxfordshire, a co-created vision and action plan on the future of a more sustainable Oxfordshire.

Locally, as a council we declared a climate emergency in April 2019, and in April 2021 we declared an ecological emergency. As a result of these declarations, we set our targets to:

- **Be carbon neutral within our own operations by 2025**
- **Be a carbon neutral district by 2030**

Our Climate and Ecological Emergencies Advisory Committee (CEEAC) was formed in September 2019 to advise on matters relating to the climate and ecological crises, and to recommend actions, policies and practices to reduce damage to the environment to Cabinet.

Climate action was also identified as a priority in our Corporate Plan 2020-2024, with one of the six themes within the plan being action on the climate emergency. Work to address the climate and ecological emergencies is also integrated throughout other themes of the Corporate Plan. Publishing this Climate Action Plan is one of the projects within the Plan. The Climate Action Plan runs in line with the dates of the Corporate Plan and contributes to our strategic vision and operations as a council.

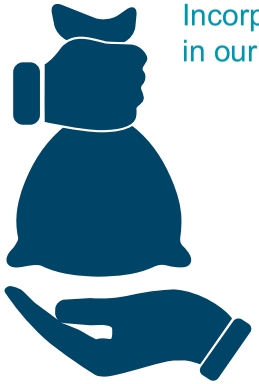
# Our Journey So Far

While this is our first Climate Action Plan, we have already implemented a number of projects and policies that address the climate emergency, including:

The publication of our tree policy for planting trees on council land, supporting the increase of tree planting across our districts link

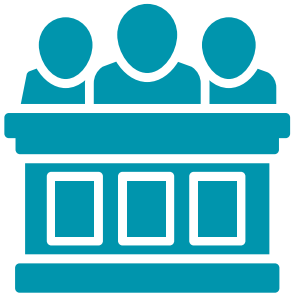
Incorporating carbon neutral and sustainable features throughout our design guide

Staff contracts have been updated to support working from home from a climate and covid safe perspective



Incorporating climate criteria in our grant funds

We have partnered with Oxfordshire Greentech to support local businesses to reduce carbon emissions



The 2021 town and parish forum focused on 'climate action – how can we take action together' with the aim to hear from town and parish councils on how they would like to see the climate emergency addressed and what climate action they are taking locally

We are implementing flood alleviation schemes to combat risks arising from climate change

# Measuring and Reporting

To measure our progress in achieving our carbon neutral target, we divided the actions in this Plan into strategic, direct and enabling actions:

| Action category | Explanation | Measuring method |
|---|---|---|
| **Strategic** | Strategic actions are those which change our approach to work and the provision of our services to reach our carbon neutral targets, and these changes will result in reductions in carbon emissions over time. These actions include updates to policy and strategy documents to better address the climate emergency, embedding climate considerations in decision making, and providing training to staff to create behaviour change in our ways of working. | While it will be difficult to measure the specific reductions in carbon emissions from each strategic action, overall reductions in the council's carbon emissions will be seen over time in our annual carbon emission baseline report as a result of taking these actions. |
| **Direct** | The results of these actions will produce a quantifiable reduction in carbon emissions from implementing a specific project or making a direct change to a service. For example, we will be able to measure the reduction in our carbon emissions from swapping to electric vehicles, or from implementing a new waste management contract. | Emissions from direct actions will be calculated using the glidepath tool, where we will be able to specifically measure the change in emissions over time. |
| **Enabling** | Enabling actions are those where we are encouraging and supporting behaviour change across our district by sharing information, advice and guidance. These actions will contribute to an overall reduction in carbon emissions across the council and district. | We will see the impact of our enabling actions through an overall reduction in carbon emissions in our annual carbon emissions baseline report. |

These three categories provide us with the methodology to review our reduction in carbon emissions over the next three years. The Plan also includes the specific reporting measures we will be monitoring for progress of each action, including the reporting type of the measure, whether they will be reported on through narrative, narrative with quantitative elements, or quantitative updates. Progress on actions will be monitored quarterly in line with the Council's Corporate Performance Management Framework, and will be reviewed at each CEEAC meeting and reported to Cabinet. Reviewing progress on the actions quarterly will allow us to keep track of the short and long-term implementation, progress and outcomes of each action. Annually, the council's greenhouse gas emissions report will be reviewed to see the reduction in our overall carbon emissions, monitoring our progress to reach our carbon neutral target.

**It is important to note that this Plan is based on national policies and strategies at the time of writing. We hope that those policies and strategies will evolve over the course of this Plan to include higher, more ambitious standards and therefore some of our actions may be superseded.**

## The Plan

The below table presents the actions the council will take to reduce its carbon emissions 2022-24. The plan has been divided into seven themes to categorise the actions. These themes are:

| Theme | Goal |
|---|---|
| **Our ways of working** | To make climate action inherent in all the council's work by designing and updating our policies, strategies and governance with the climate emergency at their core |
| **Our service delivery** | To plan and deliver services to our residents in ways that reduce carbon emissions and prepare our district for future ways of living |
| **Our people** | To create a culture of climate action amongst staff and councillors in the workplace |
| **Our land** | To approach our land management with sustainable and climate-friendly best practices |
| **Our buildings** | To decarbonise our buildings and their operations to ensure they are fit for the future |
| **Our communities** | To guide and support the district's businesses, voluntary sector and communities to take action on the climate emergency |
| **Our partners** | To work in partnership to reduce carbon emissions across the districts and support county-wide initiatives, making a greater impact together |

# Strategic Approach

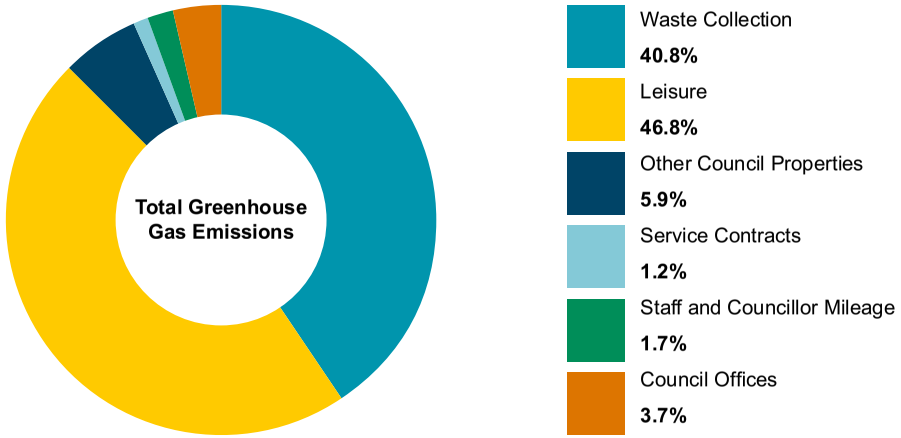
This plan focuses on how we will reduce carbon emissions from our own operations to make us a carbon neutral council. Our approach to this work is guided by our data and five principles, outlined below.

## Our Data

Looking at our council carbon emission data from our baseline year 2019/20, almost half of our emissions come from our three leisure centres, while over a third of our carbon emissions comes from our waste collection services. It is vital that we tackle our leisure and waste emissions to make the biggest impact on our carbon neutral target, which is reflected in specific actions in this Plan. Other emitters include staff and councillor mileage, our offices and properties, and other service contracts, which are also addressed in actions in this plan.

In addition to the quantitative data, we have used qualitative data to develop this plan, including feedback from the Corporate Plan consultation with residents in August 2020, where the climate emergency featured heavily, and from discussions on taking climate action at the Town and Parish Forums held in May 2021.

**South Oxfordshire District Council Greenhouse Gas Emissions 2019/20**




Source: South Oxfordshire District Council Greenhouse Gas emissions report 2019/20

## Our Principles

This Plan is guided by five principles, which we will embed in our approach to climate action as an organisation and were used to develop the actions in this plan. We will use these principles as a benchmark for future plans and policies we develop and will also use them to inform current projects. The five principles are:

| | |
|---|---|
| **Political commitment to climate action** | Political will locally and regionally to drive reductions in carbon emissions is critical in the absence of a statutory duty on local authorities to take climate action.<br>This commitment is evident at South Oxfordshire through the dedicated position of a cabinet member for environment, climate change and nature recovery. This position has a responsibility to ensure that this commitment is embedded across all actions and plans and that climate implications in decisions are considered and examined.<br>Driving forward this commitment to climate action will be vital going forward to make progress on our carbon neutral targets. |
| **Putting climate action at the heart of our decision making** | Having climate considerations at the core of our decision making, policies and ways of working is vital so that we create an organisational culture that lasts not just during the lifetime of this Plan but beyond. |
| **Working in partnership across the districts and county** | Climate Action needs everybody. We acknowledge that we cannot do this alone and there is collective strength in working in partnership to make a greater impact regionally, by pooling our resources and influence together. |
| **Commitment to inclusive engagement** | Addressing the climate emergency is a continual process and we need to ensure that our ongoing climate actions and communications meet the different needs of our communities and environment and are accessible and engaging for all. |
| **Influencing and providing advice** | Our engagement opportunities and activities are two-fold: influencing our government to lobby for national changes required to help us achieve our targets and providing advice to our communities, including our residents and businesses, to support their climate action journeys. |

# The Plan

## Our ways of working

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **Update the Corporate Delivery Framework to include considerations for climate impact and carbon emissions** | WOW1 | Quantitative | Number of projects through the Corporate Delivery Framework measures include climate impact and carbon emissions | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |
| **Implement internal governance to progress and monitor the Climate Action Plan** | WOW2 | Narrative | Update on the internal structure including it's set up and it's approach to progressing and monitoring the Climate Action Plan | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |
| **Publish an internal toolkit with guidance for staff on how to assess the climate implications of projects and proposals** | WOW3 | Narrative | Update on the content of the toolkit and examples of projects and proposal that have used learning from the toolkit for the climate implications section | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |
| **Develop and implement measures for monitoring procurement contracts based on carbon emissions and climate action** | WOW4 | Narrative | Update on monitoring of procurement contracts based on carbon emissions and climate action, providing examples of relevant contracts | strategic | Head of Finance | Cabinet Member for Finance |
| **Update the contract evaluation quality scoring procedure to include carbon reduction criteria** | WOW5 | Narrative | Report on how the contract evaluation quality scoring criteria has been updated to include carbon reduction criteria, providing examples of relevant awarded contracts | direct | Head of Finance | Cabinet Member for Finance |
| **Deliver staff training on the Procurement Strategy which includes understanding of carbon reduction objectives and criterion** | WOW6 | Narrative with quantitative elements | Percentage of staff who completed the procurement training in it's first year / report on how the training has impacted procurement contracts, providing relevant examples | strategic | Head of Finance | Cabinet Member for Finance |
| **Conduct a review of all report writing templates, adding a climate implications section where missing** | WOW7 | Narrative with quantitative elements | Percentage of report writing templates that include a climate implications section / narrative on the updates to report writing templates | strategic | Head of Legal and Democratic | Cabinet Member for Partnerships and Legal Democratic |

# The Plan

## Our ways of working

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **Divest direct investments from environmentally harmful activities where possible, whilst protecting the security of tax-payer funds** | WOW8 | Narrative | Narrative update detailing changes which have included climate elements into financial decision making | strategic | Head of Finance | Cabinet Member for Finance |
| **Incorporate a policy statement on environment/social/ governance factors into the financial implications section of all Council reports to show our commitment** | WOW9 | Narrative | Policy statement included in Council templates under financial implications | strategic | Head of Finance | Cabinet Member for Finance |
| **Engage with the council's investment portfolio to ask for and review their carbon reduction plans as part of decision making for the treasury management strategy** | WOW10 | Narrative with quantitative elements | Number of investment portfolios where we have reviewed their carbon reduction plans / narrative on any changes in decision making based on investment portfolio carbon reduction plans/ percentage of Council portfolio in Paris Agreement aligned companies | strategic | Head of Finance | Cabinet Member for Finance |
| **Review internal audit processes and where appropriate include risk considerations for the climate emergency** | WOW11 | Narrative | Report on how the internal audit processes have been updated to include carbon emission considerations | strategic | Head of Finance | Cabinet Member for Finance |
| **Refine criteria for community infrastructure levy (CIL) funding to maximise opportunities for including carbon reduction measures in projects and supporting climate action projects** | WOW12 | Narrative with quantitative elements | Narrative update about work in this area to include detail of new CIL spending strategy, communication with parishes<br><br>Quantitative elements - CIL Spend broken down by type, by parish | strategic | Head of Policy and Programmes / Head of Finance | Cabinet Member for Planning |
| **Promote community infrastructure levy (CIL) criteria to all relevant staff to ensure they maximise carbon emission reductions in all CIL projects** | WOW13 | Narrative with quantitative elements | Percentage of CIL projects that include carbon emission reduction considerations/ relevant project proposals, providing examples | strategic | Head of Policy and Programmes / Head of Finance | Cabinet Member for Corporate Services, Policy and Programmes |
| **Include more ambitious climate criteria in the conditions of our affordable housing grant funding** | WOW14 | Narrative | Report on the updates to the climate criteria of the affordable housing grant funding and how this has impacted new affordable housing developments, providing examples | strategic | Head of Development and Corporate Landlord | Cabinet Member for Economic Development and Regeneration |
| **Include policies in the Joint Local Plan that will help deliver zero carbon development and encourage more sustainable choices** | WOW15 | Narrative | Narrative update on work around planning policies included in the emerging JLP | strategic | Head of Policy and Programmes | Cabinet Member for Planning |

# The Plan

## Our ways of working

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **Produce an options paper for setting up a carbon offsetting scheme for developers as part of the new Joint Local Plan** | WOW16 | Narrative | Report on options paper development and suggested ways forward | strategic | Head of Planning | Cabinet Member for Planning |
| **Produce an options paper for pool electric vehicles for use by council staff to reduce emissions from business mileage, implementing if approved** | WOW17 | Narrative | Narrative update on the development of business case for piloting pool electric vehicles, including on the carbon emission savings and decision making progress | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |
| **Develop and implement an internal communications plan to keep staff updated on climate action work, including useful advice and guidance on how to incorporate climate action into projects and programmes** | WOW18 | Narrative with quantitative elements | Data on the number of internal communications campaigns with staff on climate action work and a narrative update on the type of information shared and any feedback from staff on the use of the information | enabling | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Move to a digital by default approach for virtual meetings where possible given the current conditions around decision making in Local Government** | WOW19 | Quantitative | Percentage of virtual meetings taken place, benchmark to include CEEAC, Scrutiny, Cabinet and Council meetings | direct | Head of Legal and Democratic | Cabinet Member for Democratic and Legal Services |
| **Improve our use of existing technology to move to digital by default working** | WOW20 | Narrative with quantitative elements | Update on the use of technology for meetings; data on percentage of MFD printing | direct | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Develop and implement an anti-idling policy for staff and contractors on council buisness, to ensure engines are turned off when appropriate** | WOW21 | Narrative | Update on the development of the policy and examples of anti-idling implementation from staff and contractors | direct | Head of Development and Corporate Landlord | Cabinet Member for Environment, Climate Change and Nature Recovery |

# The Plan

## Our service delivery

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **a) Prepare new waste management approach to align with provisions of the Environment Bill** | SD1 | Narrative | Report on the development of the new waste contract, particularly how it aligns with the Environment Bill and how it will reduce carbon emissions | strategic | Head of Housing and Environment | Cabinet Member for Environment, Climate Change and Nature Recovery |
| **b) Specify new waste management contract with route optimisation, collection frequency and vehicle size to minimise carbon emissions** | SD2 | Narrative | | direct | Head of Housing and Environment | Cabinet Member for Environment, Climate Change and Nature Recovery |
| **c) Trial electric refuse vehicles and other relevant vehicle options, to identify the most suitable vehicles for reducing carbon emissions whilst maintaining service delivery** | SD3 | Narrative | | direct | Head of Housing and Environment | Cabinet Member for Environment, Climate Change and Nature Recovery |
| **d) Replace end of life waste collection vehicles with electric fleet where range available allows** | SD4 | Narrative | | direct | Head of Housing and Environment | Cabinet Member for Environment, Climate Change and Nature Recovery |
| **Explore opportunities for a new waste depot including research into renewable energy supplies** | SD5 | Narrative | Report on proposals for a new waste depot, including potential carbon reduction figures | direct | Head of Housing and Environment | Cabinet Member for Environment, Climate Change and Nature Recovery |
| **Develop a business case and implement a delivery plan for council vehicles to be zero emission by 2025, where available on the market** | SD6 | Narrative with quantitative elements | Data on carbon reduction savings from switching vehicles to zero emission and narrative report on business case development and delivery plan for doing so, including market options for EVs | direct | Head of Housing and Environment | Cabinet Member for Environment, Climate Change and Nature Recovery |

# The Plan

## Our service delivery

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **Install EV charge points in council depot and other locations as necessary to meet needs of council fleet** | SD7 | Narrative with quantitative elements | Data on the number of EV charge points installed for use by council fleet; narrative update on the location of the EV charge points and how they meet the needs of the council fleet | direct | Head of Development and Corporate Landlord | Cabinet Member for Environment, Climate Change and Nature Recovery |
| **Provide feedback on planning applications with advice on how the proposed application could be more energy efficient and signposting to information sources** | SD8 | Quantitative | Data on the number of planning applications that include energy efficiency advice | strategic | Head of Planning | Cabinet Member for Planning |
| **Update the council planning and development webpages to signpost to advice on energy efficiency considerations for inclusion in planning applications** | SD9 | Narrative with quantitative elements | Update on the energy efficiency information provided on the council webpages; data on the number of clicks on the links | enabling | Head of Planning | Cabinet Member for Planning |
| **Work with our town and parish councils to support their proposals for projects that reduce carbon emissions locally, providing advice and guidance for their projects to be a success** | SD10 | Narrative with quantitative elements | Report on support provided to town and parish councils on their carbon reduction projects; data on number of carbon emissions reduction projects submitted by town and parish councils | enabling | Head of Planning | Cabinet Member for Planning |
| **Support the implementation of the air quality action plan across the district** | SD11 | Narrative with quantitative elements | Comms relating to AQ initiatives and metrics relating to AQ | strategic | Head of Housing and Environment | Cabinet Member for Environment, Climate Change and Nature Recovery |

# The Plan

## Our people

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **Provide all-staff and councillor training on the council's climate action plan and carbon literacy** | P1 | Narrative with quantitative elements | Data on percentage of staff that have taken the climate action plan training and narrative on how staff have integrated the training into their work, using case studies | strategic | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Provide enhanced specialist training on latest carbon reduction or climate action approaches to relevant staff and councillors** | P2 | Narrative with quantitative elements | Data on percentage of specialist training delivered to staff; narrative on how staff identify the training they need and how they have used the training in their work | strategic | Head of Corporate Services / Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |
| **Ensure there is relevant skill and capacity to support grant writing and bidding for climate related funds, maximising the opportunities to include carbon emissions reductions and energy efficiency in all projects** | P3 | Narrative with quantitative elements | Dedicated bid writing resource secured<br>Data on the number of applications to grants and funds that relate to climate action and carbon emission reduction; narrative report on grant writing skills and training that has taken place to maximise opportunities on bid writing | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |
| **Implement a green travel plan for all staff and councillors, including a digital by default approach where possible to reduce travel** | P4 | Narrative with quantitative elements | Data on staff mileage once this plan is implemented and narrative report on the changes to staff travel as a result of the plan | strategic | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Set up green champions network for interested staff to support climate work** | P5 | Narrative | Report on outcomes of green champion network meetings, including case studies of green champions to highlight key areas of work and impact of the champions | strategic | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Incorporate climate action opportunities within council volunteering scheme for staff** | P6 | Narrative with quantitative elements | Data on the number of climate action opportunities within council volunteering scheme; case studies from staff on how they have engaged with this opportunity | strategic | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |

# The Plan

## Our land

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **Following the grounds maintenance operational review, update grounds maintenance operations to enhance biodiversity and tree cover including considering the need for mowing, opportunities to allow for wilding, and reducing the use of pesticides and herbicides where possible** | L1 | Narrative | Report sharing the updates to the grounds maintenance operations that address the climate emergency and how they support biodiversity | strategic | Head of Development and Corporate Landlord | Cabinet Member for Environment, Climate Change and Nature Recovery |
| **Identify sites for new tree planting and wilding opportunities on our land or through partnership opportunities on privately owned land to support natural carbon capture** | L2 | Narrative | Report on identification of sites for new tree planting opportunities, including plans to plant trees on these sites | strategic | Head of Development and Corporate Landlord | Cabinet Member for Environment, Climate Change and Nature Recovery |
| **Prepare a business case and, if approved, implement a local renewable energy project, such as a solar farm, to address unavoidable council emissions** | L3 | Narrative with quantitative elements | Data on the amount of renewable energy produced and emissions offset; narrative update on the progression of plans for this project and how the renewable energy produced neutralises council emissions | strategic | Head of Development and Corporate Landlord | Cabinet Member for Economic Development and Regeneration |
| **Deliver the Park and Charge scheme, installing EV charge points in our car parks, in partnership with Oxfordshire County Council** | L4 | Narrative with quantitative elements | Data on the number of EV charge points installed in council car parks; narrative update on the partnership approach for delivering this project | strategic | Head of Development and Corporate Landlord | Cabinet Member for Environment, Climate Change and Nature Recovery |
| **Develop a business case for installing public EV charging points on additional council premises, including funding sources available** | L5 | Narrative with quantitative elements | Update on the business case development for installing public EV charging points; data on energy use of the points, including how much charge they provide to EVs | strategic | Head of Development and Corporate Landlord | Cabinet Member for Economic Development and Regeneration |

# The Plan

## Our buildings

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **a) Complete energy efficiency and site decarbonisation assessments for all leisure centres** | B1 | Narrative with quantitative elements | Data on the energy efficiency of all leisure centres and narrative report on site decarbonisation assessments, with projections for how the sites will be decarbonised | strategic | Head of Development and Corporate Landlord | Cabinet Member for Economic Development and Regeneration |
| **b) Following site assessments of leisure centres, prepare for external funding opportunities, including soft market testing** | B1 | Narrative with quantitative elements | Narrative update relating to external funding utilisation, both funding received direct to the Council, and projects which have received part external funding or are in progress if not already delivered<br><br>Specific elements which should be included - proportion of spend on leisure/community facilities vs amount funded by Council; externally funded Capital schemes; total external funding received figure | direct | Head of Development and Corporate Landlord | Cabinet Member for Economic Development and Regeneration |
| **a) Complete energy efficiency and site decarbonisation assessments for all non-leisure operational properties** | B2 | Narrative with quantitative elements | Data on the energy efficiency of all non-leisure centres and narrative report on site decarbonisation assessments, with projections for how the sites will be decarbonised | strategic | Head of Development and Corporate Landlord | Cabinet Member for Economic Development and Regeneration |
| **b) Prepare for external funding opportunities for non-leisure properties, particularly properties with an end-of-use heating plant, including carrying out soft market testing** | B2 | Narrative with quantitative elements | Narrative update relating to external funding utilisation, both funding received direct to the Council, and projects which have received part external funding or are in progress if not already delivered<br><br>Specific elements which should be included - proportion of spend on leisure/community facilities vs amount funded by Council; externally funded Capital schemes; total external funding received figure | strategic | Head of Development and Corporate Landlord | Cabinet Member for Economic Development and Regeneration |

# The Plan

## Our buildings

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **Prepare plan for Didcot Broadway site using sustainable designs and low carbon and water efficient standards, as well as including the provision for infrastructure that supports sustainable transport and has considered waste and recycling facilities** | B3 | Narrative with quantitative elements | Report on the sustainable design and low carbon and water efficient standards used in the plans for the Didcot Broadway site; data on expected energy usage of the building | direct | Head of Policy and Programmes | Cabinet Member for Economic Development and Regeneration |
| **Prepare Didcot Gateway site project plan to achieve the BREEAM excellent standard in addition to a 40 per cent reduction in carbon emissions compared with a 2013 Building Regulations compliant base case, and with consideration for sustainability and environmental impact throughout the design and construction of the site** | B4 | Narrative with quantitative elements | Report on the carbon emission reductions and prospective energy use of the building; including sustainability and environmental impact considerations included in the plan | direct | Head of Policy and Programmes | Cabinet Member for Economic Development and Regeneration |
| **Retrofit Cornerstone Arts Centre to ensure it is fit for purpose using energy efficient methods, including solar panels on the roof and a low carbon heating system** | B5 | Narrative with quantitative elements | Report on retrofit upgrades to the Cornerstone Arts Centre; data on carbon emissions savings from upgrades | strategic | Head of Development and Corporate Landlord | Cabinet Member for Economic Development and Regeneration |
| **Include carbon and energy reduction targets in management plans for the monitoring of site operations including all leisure centres to enforce and encourage low carbon operational behaviour in council assets** | B6 | Narrative with quantitative elements | Report on the changes to the carbon and energy reduction targets in the criteria for monitoring operations and what actions are being taken to meet these targets; and data on carbon emissions from operations | strategic | Head of Development and Corporate Landlord | Cabinet Member for Housing and Environment |
| **Develop a policy to agree an energy efficiency standard for new asset acquisitions and council owned builds** | B7 | Narrative | Update on the development of the energy efficiency standards policy for new asset acquisitions and builds, including case studies of how this has been implemented | strategic | Head of Development and Corporate Landlord | Cabinet Member for Housing and Environment |

# The Plan

## Our communities

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **Implement an external communications plan which shares updates on the climate action work undertaken by the council, and advice and guidance to residents, businesses and the voluntary and community sector on reducing carbon emissions. To include:** | C1 | Narrative | Narrative update on the influencing work undertaken to support and encourage local businesses relating to climate change and nature recovery | enabling | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Advice and guidance on circular economy principles and how to implement them, especially for businesses and the voluntary and community sector** | C2 | Narrative | | | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Advice and guidance on energy efficiency of operations, including consideration for delivery options and the energy efficiency of buildings used by businesses and the voluntary and community sector** | C3 | Narrative | | | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Share climate friendly lifestyle changes, including ways to make homes more energy efficient** | C4 | Narrative | | | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Promote climate funding opportunities for businesses, voluntary and community sectors, and residents** | C5 | Narrative | | | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Collect, share and promote ideas for community sharing and reuse to reduce waste and unnecessary consumption** | C6 | Narrative | | | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |
| **Promote relevant housing energy efficiency schemes, including grants, to residents, landlords and housing associations** | C7 | Narrative | | | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |

# The Plan

## Our communities

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **Include in Community Employment Plans considerations for addressing the council's climate neutral targets through commitments such as green skills training, sourcing through a local and sustainable supply chain, supporting local social enterprises and charities and accessing local employment** | C8 | Narrative with quantitative elements | Update on the conditions of Community Employment Plan that address the climate emergency and how they are being implemented by developers; data on the number of Community Employment Plans implemented with conditions that address the climate emergency | strategic | Head of Development and Corporate Landlord | Cabinet Member for Economic Development and Regeneration |
| **Support communities with their neighbourhood planning by providing up-to-date advice and guidance on climate measures and actions, encouraging climate considerations to be at the core of neighbourhood plans** | C9 | Narrative with quantitative elements | Data on the number of neighbourhood plans developed<br>Narrative update on the types of climate actions incorporated | enabling | Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |
| **Support taxi drivers in switching to electric vehicles, including reviewing options to incentivise the switch through fees and charges** | C10 | Narrative with quantitative elements | Data on the number of taxi drivers driving electric vehicles and narrative update on the support to taxi drivers for doing so | enabling | Head of Housing and Environment | Cabinet Member for Community Wellbeing |
| **Organise quarterly climate focused network meetings for town and parish councils, and voluntary and community organisations** | C11 | Narrative with quantitative elements | Data on number of meetings held<br>Narrative update on the agendas, outcomes and actions from the meetings | enabling | Head of Corporate Services | Cabinet Member for Corporate Services, Policy and Programmes |

# The Plan

## Our partners

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **Build relationships with town and parish councils to support and encourage their climate action initiatives** | OP1 | Narrative | Update on how the council has worked with town and parish councils on climate action initiatives, including case studies | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |
| **Identify areas in our community that are most vulnerable to the effects of climate change to ensure they are properly supported and protected to promote wider community wellbeing** | OP2 | Narrative | Update on the identification of areas most vulnerable to the effects of climate change and how the council has supported them to adapt to these changes, including through initiatives such as Better Housing Better Health | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |
| **Work with Oxfordshire County Council to support active and sustainable travel infrastructure initiatives** | OP3 | Narrative with quantitative elements | Narrative update on work with Oxfordshire County Council<br><br>Optional quantitative metrics on the amount of new footpaths/cycle paths | strategic | Head of Policy and Programmes | Cabinet Member for Environment, Climate Change and Nature Recovery |
| **Work with the Future Oxfordshire Partnership on a county-wide approach to reducing carbon emissions, building on the strategic vision and Pathways to Zero Carbon Oxfordshire** | OP4 | Narrative | Update on progress on Future Oxfordshire Partnership's county-wide approach to reducing carbon emissions,including examples of projects and programmes that address the strategic vision and Pathways to Zero Carbon Oxfordshire | strategic | Head of Policy and Programmes | Leader of the Council |

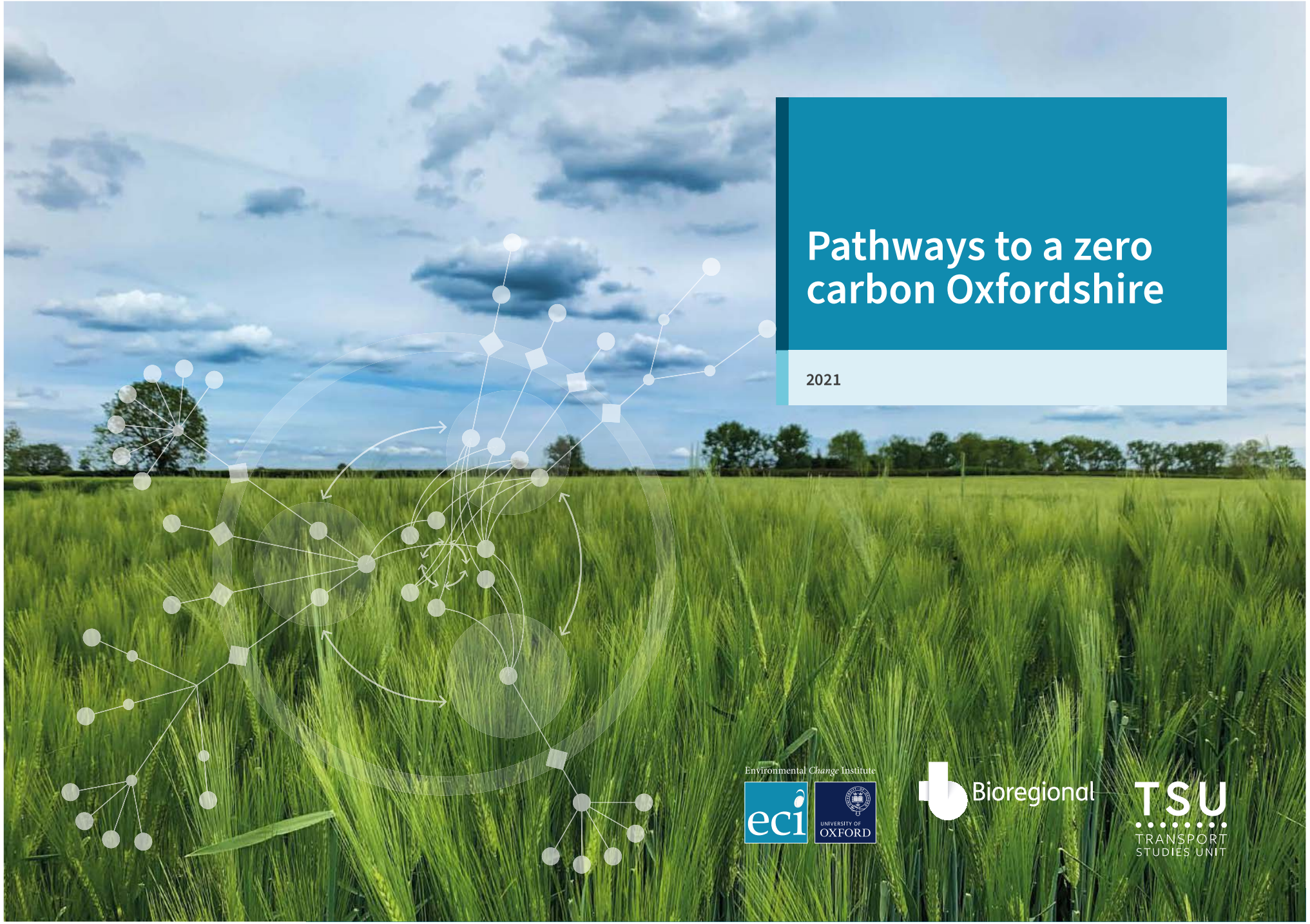
# The Plan

## Our partners

| Actions | CAP ID | Reporting Type | Reporting Measure | Strategic / direct / enabling | Officer Lead | South Cabinet Lead |
|---|---|---|---|---|---|---|
| **With our partners, support the development of a coordinated retrofit programme for Oxfordshire through our role in the Environmental Advisory Group of Future Oxfordshire Partnership** | OP5 | Narrative | Narrative update on current/completed activities of EAG and influencing activity | direct | Head of Policy and Programmes | Leader of the Council |
| **Support Registered Social Landlords in applying for retrofit funding** | OP6 | Narrative | Narrative update on engagement with Registered Social Landlords on retrofit funding | strategic | Head of Housing and Environment | Cabinet Member for Community Wellbeing |
| **Use our membership of OxLEP to ensure rapid growth of the green economy** | OP7 | Narrative | Update on the council's influence in OxLEP to ensure rapid growth of the green economy, including examples of projects and programmes that address this work | strategic | Head of Policy and Programmes | Leader of the Council |
| **Support and influence the Oxfordshire Plan 2050 ensuring climate considerations are integrated throughout the plan** | OP8 | Narrative | Update on the development of the Oxfordshire Plan 2050 with particular comment on how the Plan includes climate considerations | strategic | Head of Policy and Programmes | Leader of the Council |
| **Utilise the opportunity of the Oxford to Cambridge Arc to advance corporate objectives around the Climate Emergency** | OP9 | Narrative | Update on the councils input into the Oxford to Cambridge spatial framework and the inclusion of climate emergency corporate objectives | strategic | Head of Policy and Programmes | Leader of the Council |
| **Support the Thames Valley Rivers network to meet their aims and use this group to facilitate and influence work cross party and cross boundary to end pollution in the river and promote the sustainable use and enjoyment of the River Thames** | OP10 | Narrative | Update on work with the Thames Valley Rivers network and how these projects and programmes help to meet the aims of the network | enabling | Head of Policy and Programmes | River Thames Champion |
| **Engagement across the energy sector on activity required to move to carbon neutral and work with them to tackle the challenge of grid capacity, time of day demand and energy infrastructure** | OP11 | Narrative | Update on engagement with the energy sector and examples of work with them to tackle the challenge of grid capacity, time of day demand and energy infrastructure | direct | Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |
| **Partner with Good Food Oxfordshire to support their Good Food Strategy for Oxfordshire, ensuring climate considerations are included throughout the strategy** | OP12 | Narrative | Update on the development of the Good Food Strategy for Oxfordshire, including examples of climate considerations | strategic | Head of Policy and Programmes | Cabinet Member for Corporate Services, Policy and Programmes |

## Appendix CL2.26

## Pathways to zero carbon Oxfordshire (Pazco)


Pathways to a zero carbon Oxfordshire
2021
Environmental Change Institute
eci
UNIVERSITY OF OXFORD
Bioregional
TSU
TRANSPORT STUDIES UNIT

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## Funders and Steering Group Members:

OxLEP driving economic growth

Oxford City Council

Cherwell District Council North Oxfordshire

low carbon hub

Oxford Brookes University

Oxfordshire County Council

Greater South East Energy Hub

Scottish & Southern Electricity Networks

Vale of White Horse District Council

South Oxfordshire District Council

OSI Oxford Sciences Innovation

West Oxfordshire District Council

Cover photo: Simon Godfrey on Unsplash

# Contents


Executive summary 5

1 Introduction 12

2 A new context for zero-carbon ambition 15

3 Progress since 2014 25

4 Scenarios for a zero-carbon Oxfordshire 35

5 Catalysing low carbon innovation 50

6 Transport 66

7 Energy efficiency and heating demand in buildings 78

8 Zero-carbon energy 97

9 Land use and sequestration 116

10 Conclusions and recommendations 136

## Abbreviations

| | |
|---|---|
| **AONB** | Area of Outstanding Natural Beauty |
| **BECCS** | Bioenergy with Carbon Capture and Storage |
| **BEIS** | Department for Business, Energy and Industrial Strategy |
| **BEV** | Battery Electric Vehicle |
| **CCS** | Carbon Capture and Storage |
| **CHP** | Combined Heat and Power |
| **COP** | Conference of the Parties |
| **DECC** | Department for Energy and Climate Change |
| **DFES** | Distribution Future Energy Scenarios |
| **DNO** | Distribution Network Operator |
| **DUOS** | Distribution Use of System |
| **EPC** | Energy Performance Certificate |
| **ERDF** | European Regional Development Programme |
| **ESO** | Project ESO: Energy Superhub Oxford |
| **EV** | Electric Vehicle |
| **FES** | Future Energy Scenarios |
| **GHG** | Greenhouse gases |
| **GDP** | Gross Domestic Product |
| **IPBES** | Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services |
| **IPCC** | Intergovernmental Panel on Climate Change |
| **LEO** | Project LEO: Local Energy Oxfordshire |
| **NDS** | Nationally Determined Contribution |
| **NG** | National Grid |
| **NGESO** | National Grid Electricity System Operator |
| **OxLEP** | Oxfordshire Local Enterprise Partnership |
| **OZEV** | Office for Zero Emission Vehicles |
| **PHEV** | Plug-in Hybrid Vehicle |
| **PV** | Photovoltaic |
| **SME** | Small or medium sized enterprise |
| **TUOS** | Transmission Use of System |
| **ULEV** | Ultra-Low Emission Vehicle |
| **UNFCCC** | United Nations Framework Convention on Climate Change |
| **VC** | Venture Capital |

# Executive summary

Tackling climate change has become an urgent priority for governments, businesses and citizens around the world. In 2019, the UK Parliament passed legislation committing to a target of net-zero carbon emissions by 2050. In response, local authorities around the country have been scaling up their ambitions to tackle climate change. In Oxfordshire, all local authorities have acknowledged and responded to the climate emergency, and are developing plans to achieve net-zero carbon emissions by 2050 or sooner.

Photo: Matt Seymour on Unsplash

Oxfordshire has made rapid progress in reducing carbon emissions over the last decade, and is on track to achieve the target agreed by its local authorities of a 50% reduction by 2030.[1] While its GDP grew by 34% between 2011 and 2018, its usage of energy remained roughly constant, and $CO_2$ emissions fell by 17%.

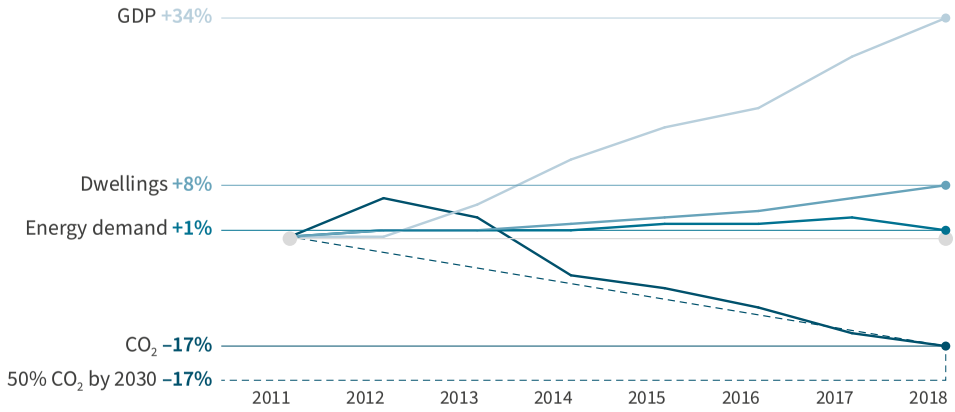
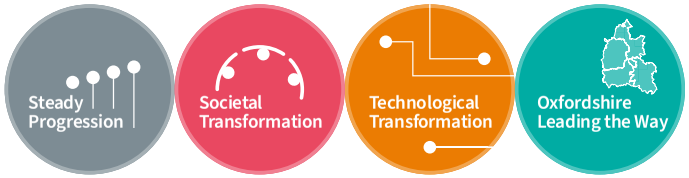



**Figure 1: Relative change in GDP, number of dwellings, CO2 emissions and energy demand (2011=1)**

This report addresses the question of how Oxfordshire can sustain the momentum of the last decade to achieve net-zero emissions. While substantial progress has been made to decouple economic growth from carbon emissions, driven by cleaner electricity supply and increased energy efficiency, there remains a significant way to go to decarbonise transport, reduce reliance on fossil fuels for heating, and protect and enhance carbon stored in the natural environment. Maintaining the same rate of emissions reduction in Oxfordshire will require relatively greater investment locally, in building retrofit, cleaner heating systems and electric vehicles; and cultural and behavioural changes such as active travel, dietary changes and reduced energy demand.

1 Against a 2008 baseline.




Our analysis shows that there are different routes to net-zero, and in presenting scenarios for the next three decades, we outline three distinct pathways to eradicating emissions from the economy.

Our **Steady Progression** scenario falls well short of stated climate aims, and illustrates the scale of change needed to achieve net-zero. **Societal Transformation** is led from the bottom up, with householders adopting new technologies and practices, and community groups corralling action. **Technological Transformation**, by contrast, relies on systemic changes driven at the national level, including the deployment of hydrogen for heating and other technical solutions which require the least change to individual behaviour. Finally, **Oxfordshire Leading the Way** mirrors the widespread cultural and behavioural changes seen in Societal Transformation, and combines this with high deployment of new local electricity generation using solar photovoltaics.

Which pathway Oxfordshire will take depends on a variety of factors, including technological innovation, macro-economic trends following COVID-19, public support, changing social norms and behaviours, and policy decisions taken at the local, national and international levels. While some factors are outside of local control, businesses, policy makers and residents in Oxfordshire have a crucial role to play in innovating, investing, strategising and implementing the changes needed for net-zero.

The second half of the report analyses the implications of net-zero for different sectors of the economy, as follows:

**Low carbon innovation**: Oxfordshire's low-carbon sector is thriving. Two of four national energy systems demonstrator projects are based in Oxfordshire, and its automotive sector continues to lead the way on innovation for autonomous vehicles, electric powertrain development and battery technologies. The University of Oxford has successfully generated 30 new cleantech spinout companies alone, with many more establishing a presence within the county and pioneering new technologies to address the challenges created by the climate emergency. The low-carbon sector is also thriving alongside high-tech industries, as community groups and SMEs develop solutions to reduce carbon emissions through alternative business models and the sharing economy.

**Transport**: Like the UK as a whole, Oxfordshire has struggled to reduce emissions from transport, despite successes such as accelerated uptake of electric vehicles in the county and increased cycling in Oxford City. There remains significant potential for more widespread walking and cycling, as the transition to net-zero cannot rely on electric vehicles alone. The key components of pathways to decarbonise transport are 'Avoid, Shift, Improve'. Switching to electric is an example of 'Improve', while telecommuting can be a way to 'Avoid' travel. A 'shift' to local, active travel can help increase footfall on local high streets and ease congestion as well as improving health. There is an urgent need for improved infrastructure for public transport and active travel; controlling and charging for parking; supporting digital connectivity that reduces the need to travel; requiring new developments to be compact and walkable; and encouraging the uptake of zero emissions vehicles.

**Energy efficiency and heating in buildings**: All pathways to net-zero require profound and widespread changes to the built environment. This includes upgrading the energy efficiency performance of the majority of buildings across Oxfordshire, and replacing heating systems which rely on fossil fuels (gas and oil), with low and zero carbon technologies (heat pumps, biomass, hydrogen). The markets for goods and services to create and maintain low-carbon buildings are small and immature. A much stronger focus on market creation and development is needed if existing technologies are to be deployed at the scale and quality required. Not only does this imply a need for a skilled workforce of installers, advisors and other intermediaries, but also regulated minimum standards to create demand, supported by a much more rigorous system of compliance-checking. There is a need to simultaneously stimulate demand and supply for high quality products and services to reduce emissions from the built environment.

**Low Carbon Energy**: Solar energy is Oxfordshire's greatest low carbon energy generation resource with the county already contributing more than 3% of the total UK solar photovoltaic capacity, more than double its share of population and land area. There is significant potential to expand local solar PV electricity generation. Each of our net-zero pathways includes substantial deployment: the most ambitious sees installed capacity expanded by up to 10 times. Increasing local renewable electricity generation is needed in response to an expected doubling of electricity demand due to the electrification of heating, transportation and high population growth, ensuring Oxfordshire takes a leading role in the decarbonisation of the electricity sector nationally. To maximise local benefits, Oxfordshire should develop local energy partnerships and the proven appetite for community energy.

As with all intermittent decentralised generation, high penetration can have significant impact on local networks with flexibility and data key to maximising system utilisation at the lowest cost to users. Oxfordshire is in the enviable position of hosting two national demonstrator projects (Project LEO and ESO) and a wealth of knowledge in this area which it must exploit.

**Land use and carbon sequestration**: Oxfordshire is dominated by intensive agriculture, with farmland occupying 70% of the county. With 14% being built-up, there is only 9% woodland and 7% other semi-natural habitats. We estimate that currently around 316,000 tonnes of $CO_2$ are sequestered each year (after accounting for at least 100,000 t lost annually when land is cleared for development); a small fraction of the 4 Mt produced through use of fossil fuels. However, around 85 Mt $CO_2$ are stored in the county's soils and vegetation and it is vital to protect and enhance this carbon store well as restoring soils, woodland and other ecosystems to enhance sequestration further.

Land is a finite and precious resource, and our scenarios reveal trade-offs between demand for land for food, bioenergy, solar, housing, carbon sequestration and biodiversity. For example, it would take 37–56% of Oxfordshire's land to produce the quantity of bioenergy envisaged in the National Grid scenarios in order to provide the 'negative emissions' (via BECCS, i.e. bioenergy with carbon capture and storage) needed to reach net-zero. Stringent energy demand reduction can reduce the need for such negative emission options. Shifting to a lower meat diet also has a vital role to play in freeing up farmland for sequestration.

Smart land-use planning with the participation of all stakeholders is essential in order to minimise trade-offs and maximise the substantial co-benefits that could be achieved through well-designed nature-based solutions, including a mix of ecosystem restoration and regenerative agriculture that enhances soil carbon storage, as well as integrating high quality green infrastructure into new developments. The proposed new Local Nature Partnership will have a critical role in developing a Natural Capital Plan for Oxfordshire that meets targets for both net-zero and Nature Recovery, as well as securing livelihoods for farmers and health and wellbeing co-benefits for local communities.

## Conclusions and recommendations

All net-zero pathways will involve:

- the expansion of solar generating capacity in Oxfordshire
- a major programme of retrofit for existing homes and non-domestic buildings
- prioritising climate goals when planning for new homes and developments
- substantial increases in electricity demand, driven by heat and transport, requiring grid reinforcement *and* flexibility provided by various means
- the phase out of gas boilers and fossil-fuelled modes of transport
- a need for innovation in food production to maintain or increase output while agricultural land makes way for development, and Oxfordshire grows its fair share of biofuels.
- protection and restoration of ecosystems and natural capital, for enhanced sequestration and increased biodiversity.

**Net-zero targets**: While each local authority in Oxfordshire has set an aspirational date for area-wide net-zero emissions, some have chosen 2050 (County Council, West Oxfordshire DC), Vale of White Horse DC is aiming for 2045, Oxford City council for 2040 and others 2030 (Cherwell DC, South Oxfordshire DC). These differences partly reflect local circumstances, such as differences between urban and rural districts, but they have substantial implications for policy, investment and local action.

Although ambitious targets can be vital for driving policy change and investment, our models suggest that achieving the earlier targets will be extremely challenging, especially without significant devolution of additional powers to local authorities. However, there are additional ways to demonstrate leadership on climate change as well as target setting, such as in using planning powers to develop policies that align with net-zero carbon developments by applying 15-minute neighbourhood principles, implementing active travel infrastructure, and including ecosystem restoration.

## Shattering myths

**"We should plant trees to offset our emissions"**

**…** we need to protect existing trees, but planting new trees can remove only a small fraction of current emissions, and we need to restore a mix of native ecosystems to reverse biodiversity loss.

**"We need a more skilled & qualified workforce"**

**…** the skills challenge is not just a supply problem, we also need demand for skills, driven by markets for zero-carbon solutions.

**"Electric vehicles are coming to save us"**

**…** switching to cleaner fuels is insufficient for net-zero. We also need to reduce our transport demand and complete more of our journeys by walking, cycling, public and shared transport.

**"Net-zero can be achieved by 2030"**

**…** without relying on offsets, the scale of investment, technological and lifestyle change, without national policy support, is unrealistic.

**"Fossil fuels are needed for economic growth"**

**…** renewable energy and other zero-carbon solutions represent opportunities for more efficient use of resources. Unlike spending on fossil fuels, investment can be kept local.

**"It all comes down to individual behaviours"**

**…** while lifestyle change and sustainable choices will be crucial, these are influenced by infrastructures, systems of provision and social norms. Reshaping these requires action from myriad actors.

**Co-benefits**: If the phase-out of carbon emissions is managed effectively, a variety of economic, social and environmental benefits can be achieved. These include the creation of high-skilled, well paid jobs in the zero carbon sector; creating cohesive and desirable places to live by empowering local communities and diverse individuals to drive action; and cutting air pollution. Restoring habitats, providing urban green infrastructure and shifting to regenerative agriculture can support wildlife while delivering ecosystem services such as natural flood management and urban cooling, and providing health and wellbeing benefits for local people.

**COVID-19 recovery**: More than 1000 people in Oxfordshire have lost their lives to COVID-19, and the pandemic has had a severely detrimental impact on nearly all residents and businesses in Oxfordshire. In the short term, energy demand and carbon emissions have fallen sharply. As the economy gets back on its feet, it is imperative that the sustainable practices adopted by businesses and individuals, such as telecommuting and active travel, are supported and sustained.

**Embodied carbon**: This report focuses on direct emissions (Scope 1) and those associated with purchased energy (Scope 2). However, there are emissions 'embodied' in the goods and services imported into the county, including the materials used for constructing new housing, the batteries used in electric vehicles, and food and biofuels that must be produced elsewhere when land in the county is used for carbon-reducing activities such as planting trees. In the next decade, the priority must be on reducing Scope 1 and 2 emissions. However, as the emissions associated with energy and transport usage reduce over time, the relative proportion of embodied emissions will grow. Climate change will need to be increasingly factored into procurement decisions and supply chain governance, whether those are major investments in construction materials for new homes, or everyday purchases such as food. A shift towards a circular economy based on reducing waste and unnecessary consumption will play a large part in reducing the embodied emissions imported in material goods.

**Infrastructure**: The forthcoming update to the Oxfordshire Infrastructure Strategy is due to include climate related indicators when evaluating the need for strategic infrastructure. While it goes without saying that all investments in local infrastructure should be compatible with net-zero, there is also a need to systematically review the role of existing infrastructure in 'locking in' high carbon practices, and plan for change. More granular data on demand patterns will help enable the more efficient use of existing infrastructure. There is a need to expand the definition of infrastructure to include Oxfordshire's building stock, and to rank retrofit as a strategic priority alongside electricity grid reinforcement and the installation of new solar generation. Green infrastructure should also be integrated into the strategy, as it has potential to deliver multiple benefits for climate, health and biodiversity.

**Financing the transition**: Local authorities have experienced significant funding cuts in the last decade, and COVID-19 has led to further financial woes. While there is uncertainty over the future of core funding for programmes to drive down emissions, there are other options for raising investment in zero-carbon solutions. These include expanding the Low Carbon Hub's model for raising community investment; following West Berkshire Council's example of launching a Green Bond, and developing projects for investment by the Oxfordshire Local Government Pension Fund.

**Partnership working**: Stakeholders in the low carbon sector have a strong record of collaborating to attract investment and drive forward innovation. There is potential to expand networks such as Oxfordshire Greentech, Community Action Group network and Low Carbon Hub CIC. The Oxfordshire Growth Board recently proposed the creation of a new environment advisory group which was supported by all local authority leaders. If properly resourced, this could drive forward the agenda set out in the Oxfordshire Energy Strategy, and begin to develop an action plan to meet climate goals. It is hoped that the evidence and modelling in this report will directly inform this advisory group, as well as the work of the proposed Local Nature Partnership.

# 1 Introduction

## Aims of the report

- Set out the new context for Oxfordshire's climate goals
- Report on recent progress on emissions reduction
- Spotlight the low carbon innovation ecosystem, which will be key for enabling the transition of all economic activity to zero emissions
- Review progress made and further changes needed in transport, building energy efficiency and heating, energy supply, and land use
- Outline different potential pathways to achieving a zero carbon economy in Oxfordshire by 2050, with milestones for 2030

Photo: Li An Lim on Unsplash

## 1.1 Background

Tackling climate change has become an urgent priority for governments, businesses and citizens around the world. In 2019, the UK Parliament passed legislation committing to a target of net-zero carbon emissions by 2050. In response, local authorities around the country have been scaling up their ambitions to tackle climate change. In Oxfordshire, all local authorities have acknowledged and responded to the climate emergency, and are developing plans to achieve net-zero carbon emissions by 2050 or sooner.

Reaching this goal is a mammoth task, but momentum is building. Despite uncertainty relating to Brexit and COVID-19, Oxfordshire is on a steep growth trajectory with major foreign direct investment flowing into its businesses and research base and, with it, increased international attention from around the world. It is widely seen as a global hub for innovation, discovery and tackling the most pressing challenges facing society. Since 2014, Oxfordshire's GDP has grown by more than 20% and its number of homes has grown by more than 10%. However, carbon emissions have already been decoupled significantly from economic and population growth, and the county is on track to achieve the target set out in the Oxfordshire Energy Strategy, of a 50% emissions reduction by 2030.[2]

In 2014, Low Carbon Oxford, in partnership with the Environmental Change Institute at the University of Oxford, published a report evaluating the scale and potential of the low carbon economy in Oxfordshire. Since then, that growth has been realised, with substantial investment being made in research, innovation and deployment of low carbon solutions.

Two of four national energy systems demonstrator projects are based in Oxfordshire, and its automotive sector continues to lead the way on innovation for autonomous vehicles, electric powertrain development and battery technologies. The University of Oxford has successfully generated 30 new cleantech spinout companies alone, with many more establishing a presence within the county and pioneering new technologies to address the challenges created by the climate emergency. The low-carbon sector is also thriving alongside high-tech industries, as community groups and SMEs develop solutions to reduce carbon emissions through alternative business models and the sharing economy.

## 1.2 New context, new approach

Seven years on from the Low Carbon Economy report, the economic, environmental and policy context is very different, illustrating the speed with which the landscape is changing. This requires a new approach to assessing Oxfordshire's contribution to mitigating climate change. Although the businesses and communities often referred to as the 'green sector' will have a crucial role to play in delivering the products and services needed to decarbonise the economy, it is imperative that activity across the economy is compatible with a zero-carbon future. This report therefore expands its scope to address the question of how Oxfordshire's entire economy can achieve net-zero emissions by 2050, or sooner. It highlights the enormous challenges ahead in transforming our energy and transport systems, substantially upgrading our building stock, and using our land for enhanced carbon sequestration. Progress since 2014 has been uneven, and the report points to areas where change and investment is urgently needed.

2 Based on a 2008 baseline.

Oxfordshire's economy is highly connected to the wider UK economy and beyond. It relies on free flows of people, capital, goods and services, and the outputs of its knowledge economy are exported around the world. As well as making a significant contribution to global climate goals through its innovation and research expertise, Oxfordshire's transition to zero-carbon will rely on developments elsewhere, including advances in technology, progressive climate policy, and broader changes to social norms and practices.

## 1.3 Scope

This document builds on the 2014 low carbon economy report which included chapters on innovation, transport, housing and energy supply, as well as provided scenarios for low carbon growth to 2030. Reflecting the new context, this report expands its scope in several ways. We expand our analysis of the built environment to include non-domestic buildings in Oxfordshire, focusing on energy efficiency and heating, and we include a chapter on land use and carbon sequestration. Although the emissions associated with food production and consumption are substantial, an analysis of Oxfordshire's food system is excluded from this study.

The scenarios in this report focus on two milestones: 2030 and 2050. The Oxfordshire Energy Strategy sets a target for 50% reduction in carbon emissions by 2030, while achieving net-zero by 2050 is now UK law. Several local authorities in Oxfordshire have stated ambitions to achieve net-zero before 2050, and we discuss the implications for earlier action in the concluding chapter.

The UK government's target refers to 'net-zero', rather than 'zero carbon', as it assumes that some residual emissions will remain beyond 2050 in very challenging sectors such as aviation and high-temperature industrial processing, requiring negative emissions solutions to counteract their continued contribution to global warming.

In the context of Oxfordshire, without a major airport nor heavy industry clusters, the implications all emissions associated with transport, buildings, energy and land use must be eradicated. As a rural county, Oxfordshire must contribute its fair share of carbon sequestration via bioenergy production and nature-based solutions, but the emphasis of this report is on achieving a zero-carbon economy without relying more than absolutely necessary on negative emissions. This emphasis is reflected in the report title, and our use – wherever feasible – of 'zero-carbon' rather than 'net-zero' to refer to the actions needed.

## 1.4 Report structure

The report is structured into nine chapters. **Chapter 2** discusses the new context for climate ambition with a focus on policy at global, national and local levels. **Chapter 3** revisits the 2014 scenarios and examines the latest available data for Oxfordshire to take stock of recent progress. **Chapter 4** then summarises the detailed analysis which follows in later chapters by setting out three pathways for eradicating emissions from Oxfordshire's economy. To illustrate the scale of change and investment required, these are compared with a **Steady Progression** scenario in which net-zero is not achieved. **Chapter 5** focuses on Oxfordshire's innovation ecosystem and the low carbon sector. **Chapters 6 and 7** examine two sectors where there remains significant distance to travel: transport and the built environment. **Chapter 8** discusses energy supply with a focus on different technologies for generating electricity and heat. **Chapter 9** reviews the role of land and carbon sequestration in achieving climate goals. The report concludes with a discussion of the implications for local policy and investment, and provides recommendations for a wide range of stakeholders.

# 2 A new context for zero-carbon ambition

Chapter author: Sam Hampton

This chapter sets out the global, and then the national, context for Oxfordshire's aims to achieve zero carbon. This includes developments in climate, energy and environmental policy, public opinion and corporate action which all influence what can be achieved locally. It discusses the Oxfordshire context for achieving net-zero, with a focus on local policies.

## 2.1 Global context

The effects of climate change have started to be observed and experienced around the world. Global average temperatures are now 1.1°C higher than pre-industrial levels, and extreme events such as wildfires and tropical cyclones are increasing in intensity, size and duration. In response, climate change has risen up the international policy agenda, and the 2015 'Paris Agreement' committed all signatories to "keep the increase in global average temperature to well below 2°C above pre-industrial levels; and to pursue efforts to limit the increase to 1.5°C".

Among national governments, climate policy ambition has been accelerating in recent years. In 2019, the UK was the first major economy to pass legislation to reach net-zero emissions by 2050. In 2020, China,[3] Japan and South Korea made similar pledges, joining the EU and much of Africa in doing so. However, no major industrialised country is currently on track to meet its goals under the Paris Agreement, and the Climate Action Tracker predicts that current policies represent a warming pathway of around 2.9°C,[4] with disastrous implications for ecosystems, human and animal populations.[5]

Many sub-national governments around the world have been proactive on climate. Initiatives such as C40 Cities and the Covenant of Mayors have driven climate leadership amongst urban municipalities, and cities have in many cases moved faster, with more ambition, than national governments. Madrid, Athens and Mexico City, for instance, have committed to banning diesel vehicles by 2025.

There has been a substantial increase in public concern for climate change in recent years. A survey of 10 countries in 2020 found that 76% of citizens see climate change as a 'major threat', compared with 55% in 2013.[6] Media coverage has grown, and movements such as *Extinction Rebellion* and the *School Strike for Climate* have given prominence to issues such as climate justice and net-zero. However, attitudes towards climate change remain polarised in many countries, which is problematic given the need for collective action.

The international corporate sector has been developing its decarbonisation ambitions too. While firms such as IKEA, John Lewis and Unilever have been championing climate action for decades, some of the world's largest companies are now taking meaningful action. Facebook and Apple have made commitments to becoming carbon neutral by 2030, and Microsoft and Google have declared plans to offset all company emissions retroactively, including by investing in geological sequestration. In the financial sector, the world's largest asset management firm, Blackrock, has begun to incorporate sustainability assessments into its investments, and in 2020 used its shareholdings to vote for climate action on the boards of 53 major corporations.[7]

3 China's target is for 2060.

4 climateactiontracker.org.

5 IPCC (2018), Long-term Climate Change: Projections, Commitments and Irreversibility.

6 Pew Research Centre (2020), Summer 2020 Global Attitudes Survey.

7 FT (14/7/20), BlackRock punishes 53 companies over climate inaction.

COVID-19 has caused unprecedented disruption to the global economy, with significant implications for climate goals. Although it is estimated that $CO_2$ emissions may have fallen by as much as 7–8%[8] during 2020, what drives climate change is the *total stock of greenhouse gas emissions*, rather than their annual rate. To use an analogy, what matters is the total quantity of water in the bath; turning the tap down for a short while has negligible effect. The bigger implications of COVID-19 are what it might mean for investment in zero-carbon technologies and the willingness to generate far-reaching and effective climate policy. Whilst the global recession associated with COVID-19 has been predicted to hit spending on renewable energy and zero-carbon innovation,[9] many governments are determined to pursue a 'green recovery', with unprecedented levels of public investment and new ambitious policies.[10]

### Global emissions trends

In 2019, global primary energy consumption was more than 24% higher than in 2014. Due to declining emissions from the power sector, greenhouse gas emissions have increased at a slower rate, of less than 1% per year. As a result of COVID-19, the International Energy Agency estimates that $CO_2$ emissions may have been up to 8% lower in 2020 than in 2019.[8] However, the rate of change in global carbon emissions is likely to become positive once again as the global economy emerges from recession following the pandemic.

## 2.2 National context

Climate policy has evolved substantially since the publication of the Low Carbon Economy report in 2014, with some contradictory measures introduced that have undermined the ability to make significant and meaningful progress. In 2015, the Renewable Obligation subsidy which had led to significant deployment of solar photovoltaics was phased out, whilst an effective moratorium was imposed on onshore wind installations. In the domestic sector, plans for all new homes to be zero-carbon from 2016 were reversed, and the government's flagship energy efficiency programme, the *Green Deal*, was plagued with issues and saw negligible take-up.[11] There was also a revision to the Vehicle Excise Duty, reducing the incentive to purchase more efficient petrol and diesel cars, and in 2019, all subsidies for small-scale solar installations were cut.

Although these policy changes undoubtedly slowed progress towards achieving a zero-carbon economy in recent years, the overall trend in the UK still is one of rapid emissions decline. Since 1990, the UK has reduced its carbon emissions by 38% – the fastest rate of any major economy,[12] despite seeing steady population growth. Several factors explain this, including energy demand reduction from efficiency measures in buildings, the decline of heavy industry, improved product design, and vehicle efficiency. The UK's electricity generation mix has become substantially cleaner as firstly, gas and renewables replaced coal as the primary means of supply, and then renewables ate into the share of gas generation.

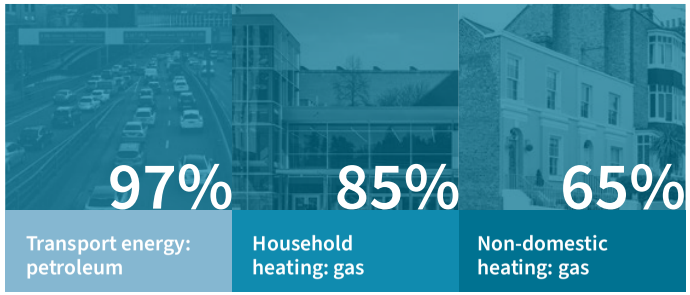
8 www.globalcarbonproject.org; and IEA (2020), Global Energy and $CO_2$ emissions.

9 Gillingham et al. (2020), The Short-run and long-run effects of Covid-19 on Energy and the Environment. *Joule*.

10 European Commission (2020), The EU budget powering the Recovery Plan for Europe.

11 Rosenow, J. & Eyre, N. (2016), A post mortem of the Green Deal: Austerity, energy efficiency, and failure in British energy policy. *Energy Research & Social Science*, 21, 141–144.

12 Carbon Brief (2019), Analysis: Why the UK's $CO_2$ emissions have fallen 38% since 1990.




Whilst electricity decarbonisation is an undoubted success story from the last decade, our reliance on fossil fuels for heating buildings and for transport remains high. Petroleum accounts for 97% of transport energy consumption, while 85% of UK households and 65% of non-domestic buildings use natural gas for heating.[13] Progress on tree planting and other options for using land to sequester carbon dioxide has also been insufficient, with an average of 9,000 ha of new woodland planted per year from 2010 to 2018, compared with a previous target of 27,000 ha[14] and a new target of 30,000 ha to be reached by 2030. Despite the growing interest in nature-based solutions to climate change, land-use change creates risks associated with complex trade-offs between food production, bioenergy, biodiversity and ecosystem services, which are explored further in Chapter 9.

### 2.2.1 A new impetus

There are signs that national government is now incorporating emissions reductions into its core strategies, rather than treating climate change as a separate policy challenge. In 2016, the Department for Energy and Climate Change (DECC) was dissolved and its functions integrated with the business department and the creation of a new Department for Business, Energy and Industrial Strategy (BEIS). It published in 2017 the UK Industrial Strategy which includes four 'Grand Challenges' of which two relate directly to climate change: achieving '*clean growth*' and becoming a world leader in shaping the '*future of mobility*'. Meanwhile, the Department for Environment, Food and Rural Affairs (Defra) has been incorporating climate change into agricultural, food and land use policies.

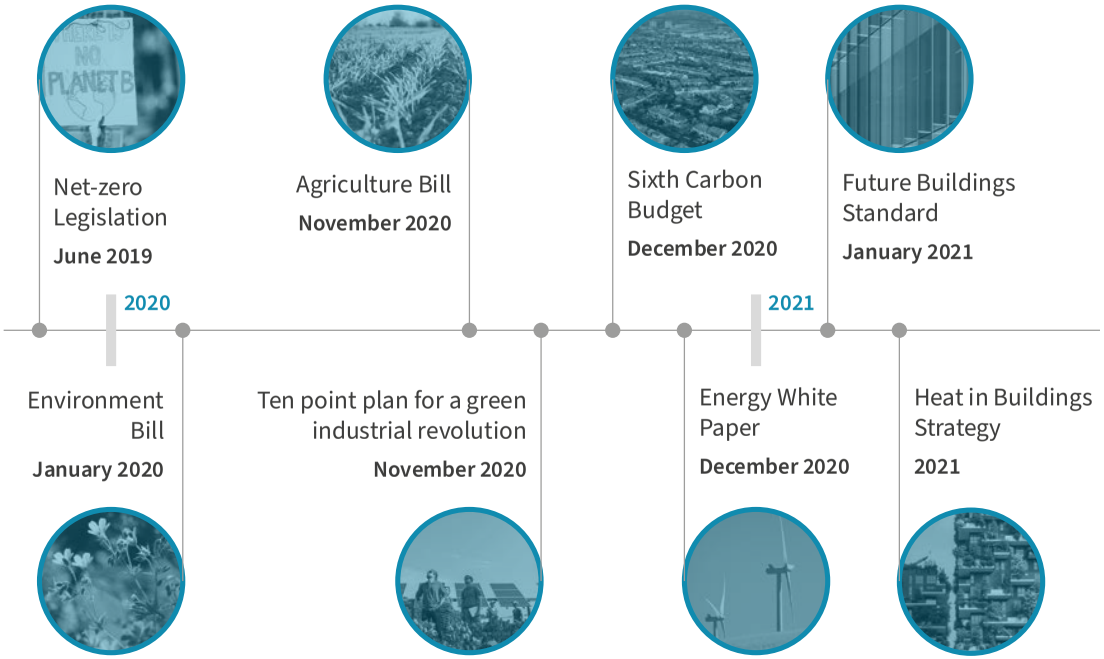
With the UK due to host COP26 in November 2021, and with a need to formulate energy and environmental policies for the post-Brexit era, 2019 and 2020 saw the publication of various policies, commitments and targets made by local and national governments. In response to renewed public support for action on climate change,[15] the UK has increased its target set out in the 2008 Climate Change Act for an 80% reduction on $CO_2$ emissions by 2050,[16] to a net-zero goal. In an experiment in deliberative democracy, the first UK-wide UK Climate Assembly was convened, subsequently releasing a report calling for education, fairness and inclusivity to be at the heart of the path to net-zero. Meanwhile, 300 (87%) local authorities have declared a climate emergency.

13 BEIS (2018), Clean Growth – transforming heating. Overview of current evidence.

14 Committee on Climate Change (2018) Land Use: reducing emissions and preparing for climate change.

15 Polling by BEIS in 2019 found that 80% of the British public are concerned or very concerned about climate change: a record high.

16 Based on 1990 levels.




In late 2020, the government published its *Ten Point Plan for a Green Industrial Revolution*, setting targets for producing 40GW of offshore wind capacity by 2030, installing 600,000 heat pumps every year by 2028, banning the sale of new petrol and diesel cars by 2030, and planting 30,000 hectares of trees every year starting in 2024. While ambitious on energy supply, vehicle electrification and tree-planting, there remains concern and uncertainty over the level of funding and strategic direction for accelerating the reduction in demand.[17]

This policy document was followed soon after by a far-reaching report on the UK's *Sixth Carbon Budget*, issued by the Committee on Climate Change. This offered detailed policy advice including phasing out fossil fuelled vehicles, investigating the potential for using hydrogen for heating, and advancing afforestation and CCS. It also called for an ambitious target of 68% emissions reduction to be achieved by 2030, to which the government quickly responded by including this in its renewed NDC.

Overall, the UK has a strong record on climate policy, having made substantial progress on decarbonising electricity supply, investing in low carbon technologies, and setting ambitious emissions reduction targets.[18] Nonetheless, the UK government's own projections for energy and emissions indicate that the rate of decarbonisation seen in the last 10 years will slow. In 2018, 23% of final energy demand was met by electricity or renewables. Projecting a gradual decline in fossil fuel reliance in transport but an increase in domestic buildings, BEIS estimates only modest progress by 2040, with electricity and renewables reaching 28% of final demand.[19]

There is now an urgent need for policy intervention to drive decarbonisation across heat, transport and land-use to meet climate goals, and national policies will continue to have significant influence over Oxfordshire's ability to decarbonise its economy.

17 CREDS (2020), Our response to the government's 10-point plan for a 'Green Industrial Revolution'

18 Economist (2021), Britain has reduced its carbon emissions more than any other rich country.

19 BEIS (2020), Updated energy and emissions projections 2019.

## 2.3 Oxfordshire context

Oxfordshire is a global centre for research and innovation, and the 2014 Low Carbon Economy report estimated that the low carbon economy generated £1.15 billion/year in sales, representing 7% of the county's economy. Our research institutions, manufacturers and community organisations continue to be at the cutting edge of low carbon innovation, pioneering new technologies to tackle climate change (see Chapter 5 for further detail).

Climate change has attracted significant concern and attention from local policy-makers. The 2019 Oxfordshire Energy Strategy[20] set the agenda for increased ambition on climate goals and energy innovation, establishing a target of 50% emissions reductions for the county by 2030. To achieve this and go on to reach net-zero by 2050, the Strategy aims to support new local renewable energy projects, and initiatives to drive demand reduction. For instance, it specified the need for a major domestic retrofit programme to bring all Oxfordshire homes up to EPC Band C by 2035, in line with targets set in the UK's Clean Growth Strategy, and for 40% of heat demand to be met by renewables.

Building on the Energy Strategy, the Oxfordshire Local Industrial Strategy[21] features clean growth as a central goal, setting out a vision for sustainable growth and enhanced productivity in the county, enabled by greater connectivity and a skills support system which provides opportunities for young people in the low carbon economy.

20 OxLEP (2019), The Oxfordshire Energy Strategy.

21 OxLEP (2019), Oxfordshire Local Industrial Strategy.

### Climate Emergency

All Oxfordshire Local Authorities have declared a climate emergency, and most have set targets for emissions reductions which exceed national goals (Table 2.1). In 2020, Oxford City Council achieved a 40% emissions reduction based on 2005 levels, and was the first UK city to hold a citizens assembly on climate change in 2019. Members of the assembly expressed a desire for Oxford to be a climate leader, reaching net-zero before 2050 by boosting biodiversity, reducing car use, and maximising the use of renewable energy. The Council responded by agreeing an emergency budget and establishing the Zero Carbon Oxford partnership to work with partners and major emitters to take action on climate. This complements other ambitious plans being developed by the City Council, County Council and partners such as the Zero Emissions Zone and all-electric bus fleet.

The other local authorities have also taken substantial steps towards climate action since 2019. A Cabinet Advisory Group on Climate has been created by Oxfordshire County Council, and a new Climate Action Framework has been agreed. This outlines priorities for action within its sphere of influence, including supporting schools, achieving net-zero operations by 2030, and working with suppliers to decarbonise the goods and services procured, as well as a commitment to work with others to deliver a zero-carbon county. The County Council are also working closely with Cherwell District Council (CDC) through a new joint climate action team, and CDC have incorporated several climate policies in their Local Plan, with a focus on driving carbon reduction through the planning process. West Oxfordshire DC have created a Cross-Party Climate Action Working Group to oversee climate action, while South Oxfordshire and the Vale of White Horse DCs have ambitions for achieving net-zero well in advance of the national target.

**Table 2.1: Net-zero targets set by Oxfordshire Local Authorities**

| Local Authority | Carbon neutral council operations | Area-wide goal |
|---|---|---|
| Oxfordshire County Council | 2030 | 2050 |
| Cherwell District Council | 2030 | 2030 |
| Oxford City Council | 2030 | 2040 |
| South Oxfordshire District Council | 2025 | 2030 |
| Vale of White Horse District Council | 75% reduction by 2025<br>Aspires to net-zero by 2030 | 75% reduction by 2030<br>Net-zero by 2045 |
| West Oxfordshire District Council | 2030 | 2050 |

In declaring a Climate Emergency, the councils have publicly committed themselves to expending more resources on enabling a low carbon transition, with particular emphasis on updating infrastructure to make it fit for 21st century living and commuting, signing off on ambitious zero-carbon developments, and assigning budget to sustain initiatives such as Oxfordshire's Living Labs.

### 2.3.1 Decoupling growth from emissions

Compared with other regions of the UK, population growth in Oxfordshire is rising more rapidly, with implications for transport demand, energy use and ecosystem services. As we discuss in the following chapter, the construction of 100,000 new homes in Oxfordshire between 2011 and 2031 appears to be on track, with more than 27,000 homes built since 2014, and a further 66,000 included in local authority plans. While no plans have been agreed beyond this, the National Infrastructure Commission[22] speculated on a target for one million new homes along the Oxford-Cambridge arc by 2050. The 2017 Oxfordshire Infrastructure Strategy forecasts house building rates to continue at least the same rate past 2031, adding 38,500 new dwellings to Oxfordshire's housing stock between 2031 and 2040. We estimate that Oxfordshire's population could increase by 25% between 2019 and 203128 and it is essential that growth of population, housing and economic output do not lead to higher carbon emissions. In other words, $CO_2$ emissions must be 'decoupled' from growth. To achieve this at a rate which achieves zero-carbon by 2050, new dwellings must produce zero or even negative carbon emissions, and new demand for heat, electricity and transport must be provided by zero-carbon sources.

22 NIC (2017), Partnering for Prosperity: A new deal for the Cambridge-Milton Keynes-Oxford Arc.

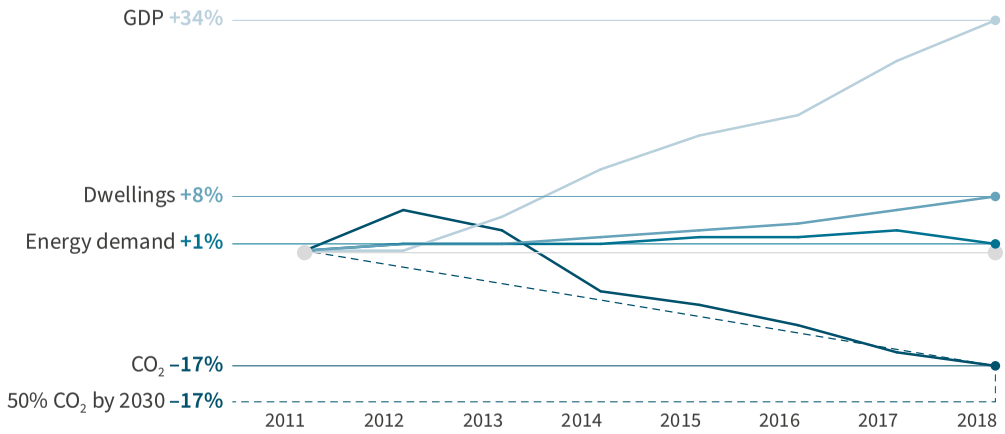



**Figure 2.1: Relative change in GDP, number of dwellings, CO2 emissions and energy demand (2011=1)**

Recent evidence highlights that decoupling has begun in Oxfordshire. Between 2011–18, over 26,000 new dwellings were built, leading to a population increase of 5% in the county. GDP grew by 34% over the same period. However, as shown in Figure 2.1,[23] demand for gas, electricity and transport remained roughly constant over this period, representing an annual reduction in energy intensity of around 5%. *$CO_2$ emissions fell* by 17% over this period, which indicates that in 2018 Oxfordshire was on track to achieve the target set by the Oxfordshire Energy Strategy of achieving a 50% emissions reduction by 2030 (see dotted line).

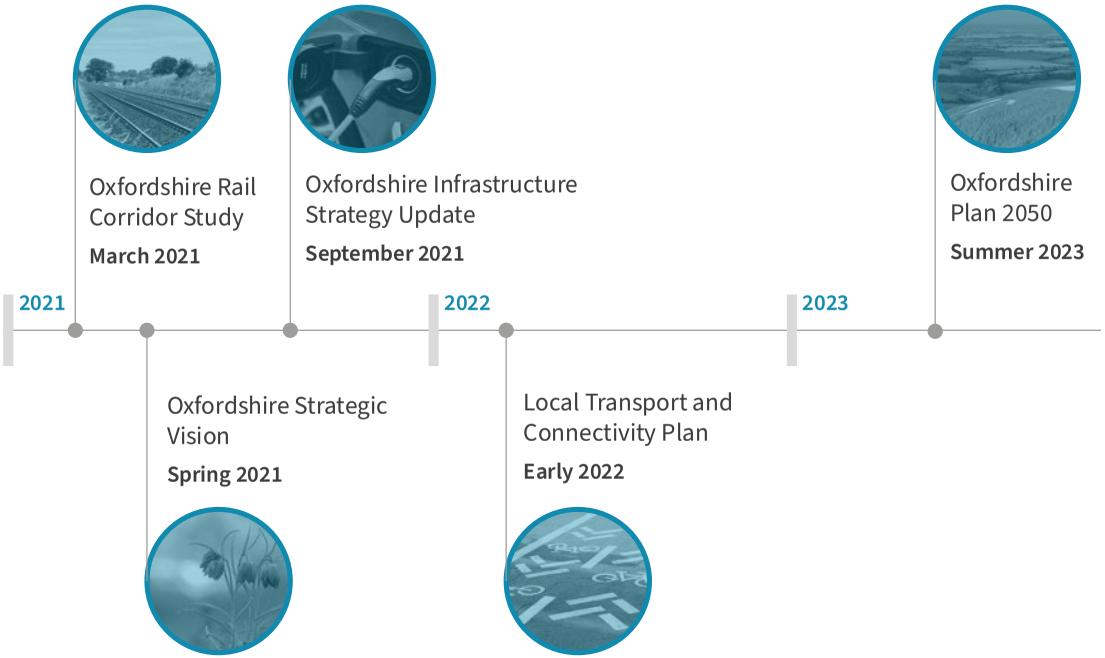
This is a clear success story, demonstrating that significant progress on climate mitigation can be achieved in a short space of time. Much of this progress has been driven by energy efficiency policies at the UK and EU level, and the rapid deployment of offshore wind on the electricity grid. Maintaining the same rate of emissions reduction in Oxfordshire will require relatively greater investment locally, in building retrofit, cleaner heating systems and electric vehicles; and cultural and behavioural changes such as active travel, dietary changes and reduced energy demand.

## 2.3.2 Local policy to deliver climate goals

Amongst those planning and preparing for significant growth in Oxfordshire, there is increasing recognition of the need for a strategic vision with environmental sustainability and zero-carbon goals at its heart. The Oxfordshire Growth Board, for instance, have called on central government to either reform national building standards in line with zero-carbon ambitions, or to allow local planning authorities to maintain local flexibility to exceed UK standards. In their 'strategic vision', the Growth Board sets out an ambition for Oxfordshire to be carbon neutral by 2040. It also proposes definition of 'good growth', which in summary, will:

- Enhance the historic and natural environment
- Support a diverse high-value economy
- Be high-quality and resilient to change
- Be sustainable, clean and green
- Embrace innovation and technology
- Be healthy and inclusive

23 Sources: ONS (2019), Regional GDP reference tables; MHCLG (2020), Table 100 Dwelling stock: Number of Dwellings by Tenure and district: England; 2019; BEIS (2020), Sub-national total final energy consumption; BEIS (2020), UK local authority and regional carbon dioxide emissions national statistics: 2005–2018.




There is increasing recognition that infrastructure investment must be compatible with zero-carbon ambitions. With decadal lifespans, investments in infrastructure in the near term have significant implications for achieving climate goals, as carbon emissions become 'locked in' to systems of energy provision, transport networks, waste processing and land use. Rather than using simple cost-benefit calculations, the forthcoming update to the Oxfordshire Infrastructure Strategy[24] adopts a broad set of criteria for evaluating future infrastructure projects, assessing their impact against environmental impact, health, place-shaping, connectivity and productivity. It will also promote the efficient use of existing infrastructure.

While these are positive developments, there is a need to consider a broader definition of infrastructure beyond roads, rail and utilities, to highlight the need for investment in upgrading the energy efficiency of the building stock, for instance. as well as green and blue infrastructure such as sustainable drainage systems and urban green spaces.

Timeline of forthcoming Oxfordshire policies and strategic reports:

- Oxfordshire Strategic Vision – Spring 2021
- Oxfordshire Rail Corridor Study (March 2021)
- Oxfordshire Infrastructure Strategy Update – September 2021 (Stage 1 report)
- Oxfordshire Plan 2050 – Summer 2023
- Local Transport and Connectivity Plan – early 2022

In the last 12 months, the Oxfordshire economy has broadly been resilient to the challenges created by COVID-19, due to the region's diverse business base and strong science and technology industries. The most exposed part of the economy has been the sectors which comprise the visitor economy (retail, tourism, hospitality, leisure, arts and culture) which supports 40,000 jobs across the county and contributes over £2.4bn per annum in GVA. The Oxfordshire Economic Recovery Plan (ERP)[25] identifies that the sector was losing over £140m per month during the height of the lockdown, with 85% of businesses reporting at least a 50% drop in revenue and over 70% had closed altogether. Economic projections within the Plan suggest a net overall loss of c6,000 jobs in the economy during the next 5–6 years but a substantial and accelerated recovery from 2021/22 onwards which will return Oxfordshire's growth levels back to pre-COVID-19 levels.

24 AECOM (2017), Oxfordshire Infrastructure Strategy.

25 OxLEP (2021), Oxfordshire's Economic Recovery Plan.

The ERP and other proposals emphasise the importance of ensuring that the recovery is also able to deliver on environmental and climate change objectives. Measures to create liveable streets and improve air quality, by temporarily pedestrianising city-centre streets during the summer of 2020 and installing additional bike parking spaces were implemented in Oxford City. The County Council has been planning how to spend an additional £3 million on active travel measures in the next year, supported by funding from the DfT Active Travel Fund. This includes a number of Low Traffic Neighbourhoods, traffic filters and point closures in Oxford, as well as pedestrian and cycle infrastructure in Bicester, which will help deliver proposals with the Oxford and Bicester Local Cycling and Walking Infrastructure Plans (LCWIPs) endorsed by the County Council in March 2020. In West Oxfordshire, the Council also included climate as one of the four pillars of its COVID-19 Recovery Plan, implementing a Sustainability Standards Checklist through which all planning applications will be required to meet standards relating to water use, flood risk, biodiversity, net-zero, waste and low-carbon transport.

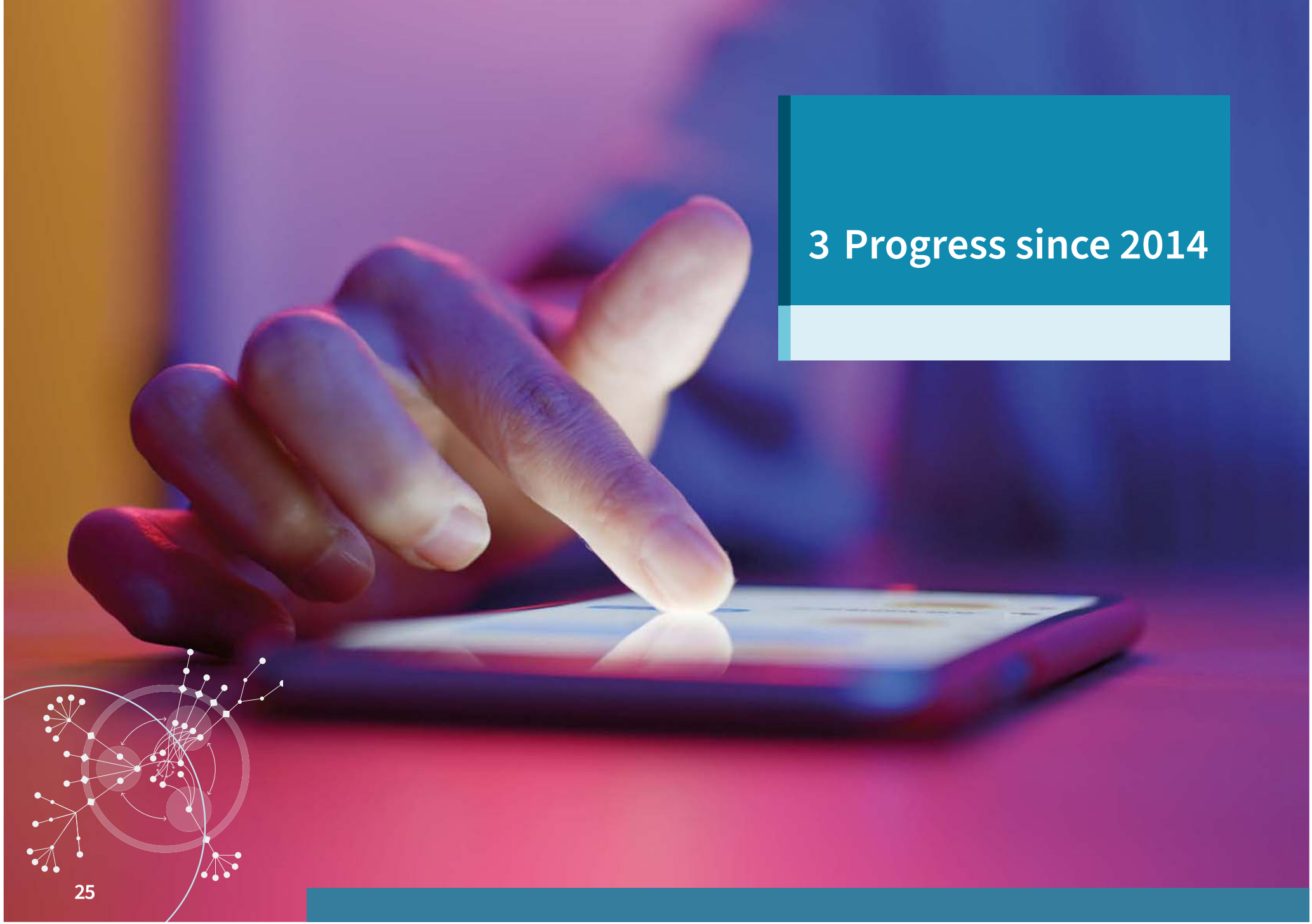
In recent years there has been a significant shift in local policy towards acknowledging the climate emergency, and renewed ambition is evident in the Energy Strategy, the County's Climate Action Framework, the various Local Authority net-zero targets, and forthcoming strategy documents. In order to continue the trend of decoupling growth from $CO_2$ emissions, there is an urgent need for the principles and concepts articulated in these policy statements to be translated into tangible action. This will include a major programme of building retrofit, deployment of local renewable generation, infrastructure to support active travel, and accelerated ecosystem restoration.

### Emissions scope

The Greenhouse Gas (GHG) Protocol categorises emissions into three categories, or 'Scopes'.

When referring to a geographical region, Scope 1 includes direct emissions occurring within the county boundary, including fossil fuels combusted in vehicles or boilers. Scope 2 refers to the emissions associated with energy used locally but generated elsewhere (e.g. electricity), and Scope 3 includes all other indirect emissions from activities including carbon embodied in products purchased, or flights taken by Oxfordshire residents from airports outside the county.

To avoid issues such as double counting, this report focuses on Scope 1 and 2.



# 3 Progress since 2014

Progress on reducing greenhouse gas (GHG) emissions in Oxfordshire has been more rapid than other areas of the UK, when considering growth in population and GDP. Total $CO_2$ emissions in 2018 were 4.1Mt (1.2% of the UK total),[26] representing a 27% reduction since 2008, despite an increase in population of 7.6% over the same period.[27] While per capita emissions in Oxfordshire are falling, they remain slightly higher (5.9t) than the national average (5.2t), correlated with higher-than-average household income.[28]

**Figure 3.1: Scope 1 and 2 $CO_2$ emissions in Oxfordshire by sector, 2008 and 2018**

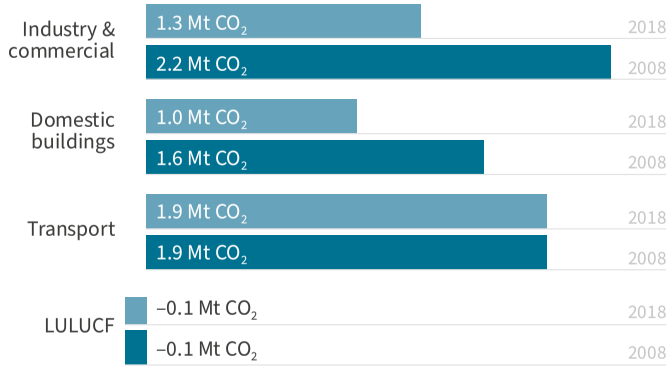



Figure 3.1 shows that the largest share of Oxfordshire's $CO_2$ emissions come from the transport sector, which has declined by only 1.9% since 2008.[29] The industrial and commercial sector includes all non-domestic buildings emissions, agricultural processes and waste processing, and its contribution to $CO_2$ emissions has declined by 44% over the same period. Land use, land use change and forestry (LULUCF) are a source of net carbon sequestration, due to forest and grassland cover in rural parts of Oxfordshire.

In 2018, BEIS estimate that this sector absorbed 98 kt $CO_2$, an increase of 71% on 2008 levels, which is 2.4% of annual net emissions from all sources. However, these estimates are based on a coarse disaggregation of national datasets and the assumption of a continuation of pre-2007 trends in land use change. More detailed estimates presented in chapter 9 suggest that current sequestration rates are around three times this level, i.e. around 7% of total net emissions, but may be declining rather than increasing.

26 County level emissions data is only available for $CO_2$, not other greenhouse gases (GHGs). UK emissions of $CO_2$ make up 81% of GHGs, with the remainder from methane (11%), nitrous oxide (5%) and fluorinated gases (3%). Emissions from industrial and commercial sectors are underestimated when compared with transport, because of methane emissions associated with heating and livestock farming, and nitrous oxide derived from agricultural processes. Source: BEIS (2020) 2018 UK Greenhouse Gas Emissions, Final figures.

27 A baseline of 2008 has been used for throughout this report for consistency with the Oxfordshire Energy Strategy, although the focus of this chapter is on progress made since the 2014 Low Carbon Economy report. Between 2014 and 2018, emissions fell by 12%, and population grew by 2.7%.

28 ONS figures. Median gross annual pay in 2018 for UK: £25,780; for Oxon: £28,770. Oxon earnings are 12% above national, while $CO_2$ emissions are 14% higher than average.

29 Contributions from through-traffic, using highways infrastructure and railways means that estimating transport emissions within administrative boundaries is difficult, and the influence of local policy-makers is limited.

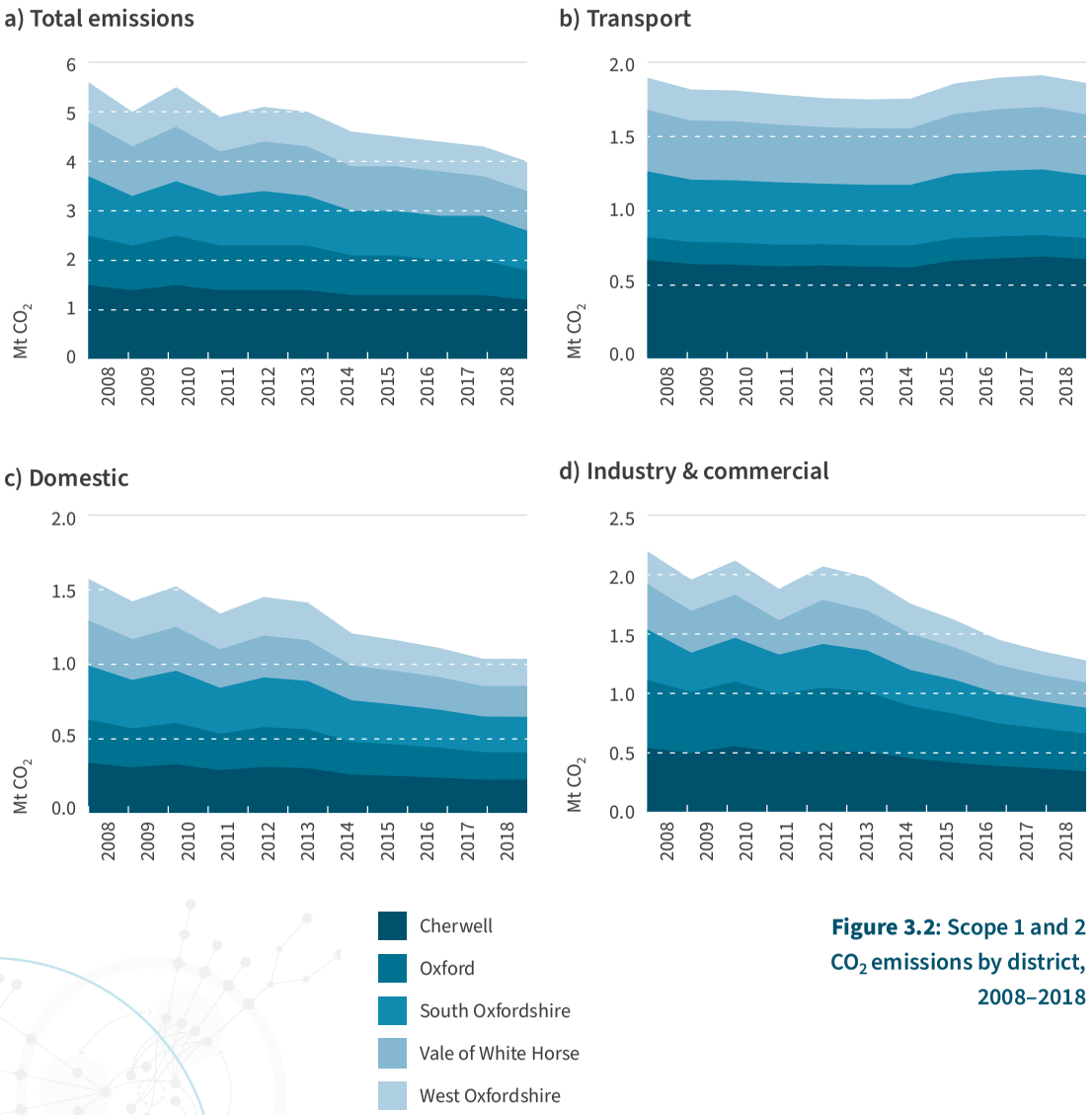



**Figure 3.2:** Scope 1 and 2 $CO_2$ emissions by district, 2008–2018

The charts in Figure 3.2 show recent trends in carbon emissions, broken down by sector district in Oxfordshire. Total emissions in all parts of the county have fallen since 2008, but transport emissions remain high. Chart b) includes emissions from motorways, which partly explains relatively high figures from Cherwell and South Oxfordshire.

## 3.1 Revisiting the scenarios from the 2014 Low Carbon Economy Report

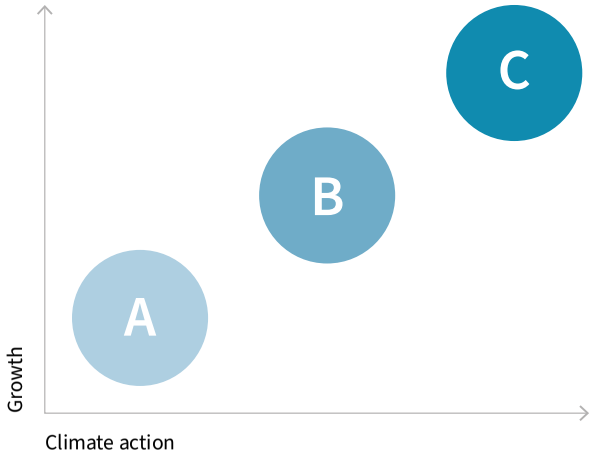
Three scenarios were included in the 2014 report on Oxfordshire's low carbon economy.

**Scenario A** was a 'business as usual' projection with low ambition for reducing GHG emissions. It extrapolated from historic trends on house building, retrofit, renewables deployment and low-emission vehicle uptake.

**Scenario B** modelled incremental housing and employment growth with moderate climate ambition, and its figures were based on existing Local Plans. This included 50,000 new homes by 2030, and over 34,000 ultra-low emission vehicles (ULEV) being registered per year. Scenario B assumed 400 homes would undergo deep retrofit per year, and that local renewables generate 23% of electricity and 5% of heat by 2030.

**Scenario C** combined much higher growth with radical ambition for achieving a low carbon economy. It assumed that 100,000 new homes would be built in the county by 2030, and constructed to meet the highest standards of energy efficiency. Additionally, 4,000 homes would be refurbished per year to achieve best-practice levels of energy efficiency, covering a quarter of all existing domestic buildings by 2030. Scenario C projected that 38,133 new ULEVs would be registered annually by 2030, and local renewables would meet 56% of electricity and 40% of heat demand in the county.

**Figure 3.3:** A simplified representation of the 2014 scenarios




### 3.1.1 Observed trends

This section reflects on trends in housing, transport, energy efficiency and renewable generation in Oxfordshire since 2014 by analysing the latest figures available. Table 3.1 lists several key indicators used in the 2014 report. Based on the analysis which follows, the highlighted cells in the table reveal which of the A, B or C scenario figures for 2030 best describe the trajectory Oxfordshire is following.

**Table 3.1 – Key indicators from the 2014 scenarios**

| 2030 Scenarios | A | B | C |
|---|---|---|---|
| New Homes | 37,000 | 50,000 | **100,000** |
| No. of homes retrofitted per year | **40** | 400 | 4,000 |
| Share of EVs in new fleets | 1% | 10% | **25% – underestimate** |
| Home EV chargepoints | 1,000 | **10,000** | 30,000 |
| Public fast EV chargepoints | 10 | 100 | **300 – underestimate** |
| Renewable electricity supply (GWh) | 539 | **842** | **2052** |
| Renewable heat supply, (GWh) | **63** | **258** | 2183 |

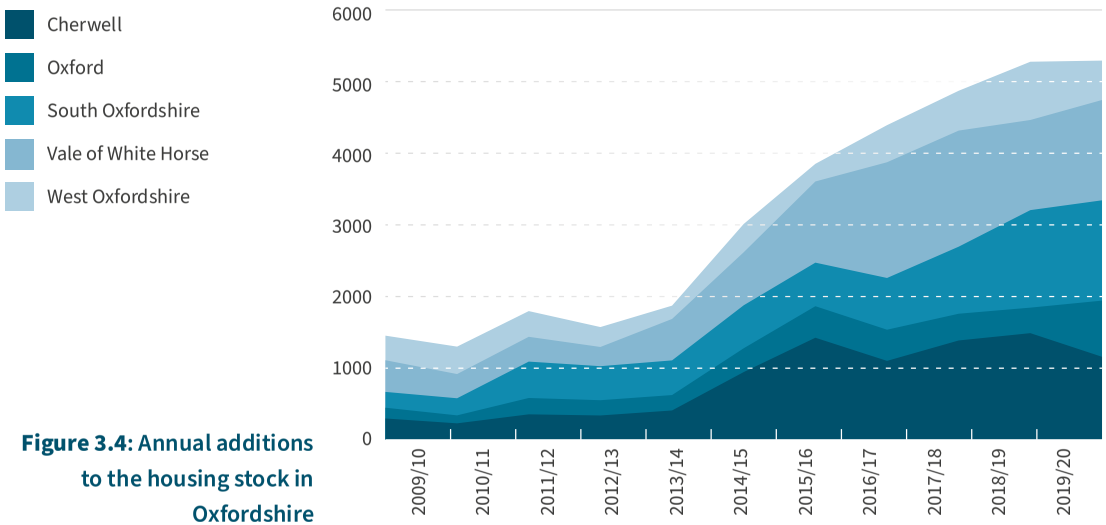



**Figure 3.4: Annual additions to the housing stock in Oxfordshire**

**Housing**. The Oxfordshire Strategic Housing Market Assessment (SHMA)[30] forecasted a need for 100,000 new homes in the period 2011 to 2031. A net total of 31,943 new dwellings were added to the housing stock in the nine years from 2011–12 to 2019–20.[31] While this average rate of house building (3,154 pa) is lower than the 5,000 pa needed to meet the stated housing need, Figure 3.4 shows this rate has been accelerating in recent years.[32],[33] Local authorities are due to undertake a comprehensive review of housing need as part of the emerging Oxfordshire Plan 2050.

The energy efficiency standards for new homes within the Oxfordshire Local Plans are predominantly set by national policy, and these are currently incompatible with achieving zero-carbon by 2050. Only 1.5% of all new-builds were awarded an EPC rating of A between 2014 and 2020, while the majority of these were connected to the gas grid for heating.[34]

30 Oxfordshire Strategic Housing Market Assessment (2014).

31 District and City Council Annual Monitoring reports and MHCLG (2019) Table 122: housing supply; net additional dwellings, by local authority district, England 2001–02 to 2018–19. Figures for 2019/20 in South, Vale and West are estimated based on Annual Monitoring report trajectory charts or average delivery in housing supply.

32 Total dwellings in 2019: 295,517, based on MHCLG (2020) Table 100: Number of dwellings by tenure and district.

33 Note that this rate of house building represents a significant increase in population. Between 2011 and 2019 Oxfordshire's population grew by 5.6%. Current ONS projections estimate a further 5.1% increase from 2019 to 2031. However, these estimates do not take account of the population growth associated with planned housing development. This point is made by EEH in a recent report, who project Oxfordshire's population to be as high as 875,000 in 2030 and nearly 1.1m by 2050. Based on recent and planned house building, and assuming a mid-range estimate of 2.35 people per household, our estimates fall between the two. We project Oxfordshire's population to reach 862,000 by 2031, an increase of 25% based on 2019 levels.

34 BEIS sub-national estimates of gas network connections indicate that almost all new homes in Oxfordshire were fitted with gas meters between 2015 and 2019, and that 82% of households in Oxfordshire use gas for heating.

Enhancing the quality of construction, installing heat pumps or even building low carbon district heating networks are measures that may increase the cost of house-building in the short term, but the implication is that without these, expensive retrofit will be needed in future if Oxfordshire is to achieve zero carbon emissions.[35]

The 2014 Low Carbon Economy report highlighted the need for an extensive programme of domestic retrofit in order to reduce energy wastage and associated carbon emissions. While the energy efficiency of Oxfordshire's housing stock is slightly higher than the national average, only 46% of homes achieve an EPC rating of A–C upon completion.[36] Scenario C proposed that 4,000 buildings per year would need to be upgraded to the highest standards of energy efficiency to achieve emissions reductions goals. Unfortunately, no comprehensive dataset on energy efficiency improvements exists, so it is difficult to evaluate progress against this goal. However, government figures relating to the two main retrofit policies, ECO and the Green Deal, indicate that only 0.5% of Oxfordshire households have installed measures through these schemes, which is amongst the lowest rate nationally.[37]

ECO has been running since 2013 and focuses on fuel poor households, of which Oxfordshire has a lower-than-average share. However, estimates indicate that 8.5% of households are living in fuel poverty,[38] which is likely to be higher in the wake of COVID-19 related trends. Uptake of the Green Deal was low across the country.

**Transport**. Uptake of ultra-low emission vehicles (ULEV) is accelerating rapidly across the UK. In 2019, 3.3% of all new cars registered in the UK were ULEVs, whereas in the first half of 2020, this figure climbed to 8.7%. There is also a rapid shift underway towards the uptake of 100% battery electric vehicles (BEVs), away from plug-in hybrid vehicles (PHEVs). In 2019, new BEV registrations exceeded PHEVs for the first time, and during Q2 of 2020 (a period of national 'lockdown' related to COVID-19), the proportion of new BEVs doubled compared with the previous 3 months, reaching 7.4% of all new car registrations.

Uptake of ULEVs in Oxfordshire exceeds the national average. By the middle of 2020, there were 4,381 ULEVs licenced in Oxfordshire, of which 2,200 were battery electric vehicles (BEVs). This represents less than 1% of licenced vehicles in the county, but the numbers of zero emission vehicles are growing by nearly 50% per year. Although uptake of ULEVs is relatively faster in Oxfordshire than the UK as a whole, it is worth noting that adoption lags behind many European states. Whilst ULEVs represented 23% of all new vehicle registrations in the UK in December 2020, this figure was 72% in the Netherlands, 49% in Sweden, and 27% in Germany.[39] Scenario C had assumed that 25% of new vehicle registrations would be ULEVs by 2030. While considered a stretching target at the time of writing, this figure now looks conservative, and will be overtaken following the decision, in 2020, by the UK government to bring forward its ban on new fossil fuelled vehicles to 2030; meaning that by law, 100% of new registered vehicles will be ULEVs by that date.

35 Currie and Brown (2019), The costs and benefits of tighter standards for new buildings. A report for the Committee on Climate Change.

36 www.domesticenergymap.uk

37 BEIS (2020), Household energy efficiency statistics. Efficiency measures installed prior to 2013 are not included in these figures.

38 Affordable Warmth Network (2019), Report on Fuel Poverty and poor Housing Conditions.

39 International Council on Clean Transportation (2021), Market Monitor: European passenger car registrations, January–December 2020.

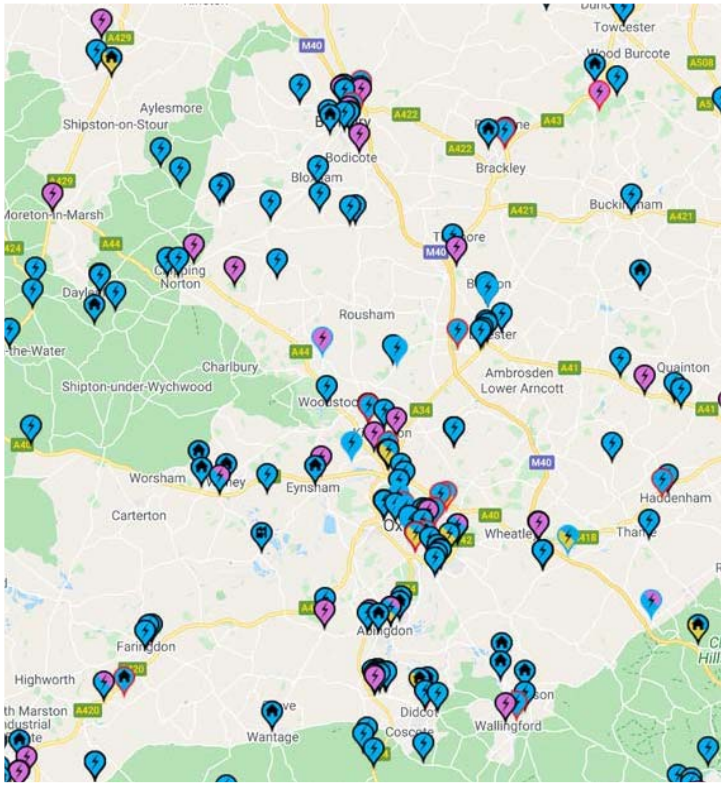



**Figure 3.5:** Fast (22 kW, in blue) and Rapid (≥50kW, in purple) public electric vehicle charging points in Oxfordshire. Source: ZapMap

Scenario C included the installation of 30,000 domestic and 300 public electric vehicle charging points by 2030. Unfortunately, there is no comprehensive database of domestic installations, and the Office for Zero Emissions Vehicles (OZEV) do not publish data on the numbers of installations funded through their domestic and workplace grant schemes broken down by local authority area.

However, analysis of data shared by OZEV indicates that roughly 2000 domestic and 120 workplace chargers have been funded in Oxfordshire through their *EV Homecharge Scheme* and *Workplace Charging Scheme* respectively.[40] It is difficult to estimate what proportion of all EV chargers this represents, as some chargers are likely to have been installed without grant support. Tesla, for instance, opted not to participate in the scheme as a manufacturer of chargepoints, and typically provide these to households alongside the purchase of new vehicles. Other EV users may use standard 13A plug sockets.

Data on public charging infrastructure is more readily available, and in 2020, there were a total of 240 devices in Oxfordshire available for public use, of which 44 (18%) were classified as 'rapid'.[41] However, according to the Oxfordshire Electric Vehicle Infrastructure Strategy, the distribution of public chargers is patchy, with most centred in Oxford, and little provision in smaller market towns. An additional challenge is providing access to chargers for the 30%+ of Oxfordshire households without access to off-street parking.[42] Several initiatives are under way to address the challenges of providing fair access to public chargers however. These include the Go Ultra Low Oxford[43] project which is rolling out chargers in Oxford City neighbourhoods with no off-street parking; and Park & Charge,[44] which is installing rapid chargers in public car parks across Oxfordshire. These projects alone expect to deliver an additional 380 chargers, indicating that progress on public charging infrastructure is ahead of even the most ambitious scenario from 2014.

40 Figures provided by OZEV for January 2021.

41 Rapid devices are those rated at 43kW or above.

42 Oxfordshire Electric Vehicle Infrastructure Strategy (2021).

43 Hampton, S, Schwanen, T, Doody, B. (2019) Go Ultra Low Oxford, monitoring and evaluation of Phase One, Final Report.

44 www.parkandchargeoxfordshire.co.uk

The 2014 study called for 200 km of new cycling infrastructure, and the provision of personalised travel plans to every household in Oxfordshire. However, neither initiative has been progressed to date, nor has the proposed 50 km Oxfordshire Busway been commissioned. That said, there has been investment brought forward in other areas including two Local Cycling and Walking Infrastructure Plans (LCWIPs) for Oxford and Bicester, with over £3 million committed to deliver elements of these plans over the next year. Other investments in cycling infrastructure include £16.7m through the 'Access to Headington' scheme, and £5.8m for five routes of the Science Vale Cycle Network, connecting parks at Culham Science Centre, Milton Park and Harwell Campus with the surrounding area. Councils and other stakeholders across Oxfordshire continue to lobby for greater investment from central government, including via the National Infrastructure Commission who called for £150m to be invested in Oxford's cycling network.

The electrification of buses was not included in the 2014 scenarios but has risen up the policy agenda in recent years, driven by several factors including Oxfordshire's thriving automotive sector, and levels of air pollution in some locations in Oxford City which are exceeding legal limits. The national demonstrator pilot, *Energy Superhub Oxford*, is helping to provide the infrastructure needed for rapid bus charging, while in early 2021, the government announced that Oxford and Coventry are set to become the UK's first all-electric bus cities. Our scenarios in Chapter 4 now include figures for the electrification of Oxfordshire's bus fleet.

**Energy supply**. When it comes to renewable electricity supply, Oxfordshire's most significant potential is in solar photovoltaics. Representing 72% of local generating capacity (see Figure 3.6), its solar fleet represents 3% of the national total: double its share of emissions. Based on land area and population density, Oxfordshire is comparable with other southern counties, such as Cambridgeshire, Hampshire and Wiltshire.

Its technical potential for wind generation is lower than many coastal and mountainous UK counties, and Oxfordshire has already harnessed much of the potential from landfill gas and waste. Total renewable electricity capacity is aligned with its share of the national population, at 1% (453MW). Generation (533GWh in 2019) is 0.6% of the national total.[45]

Despite the decline of subsidies in recent years, renewable generation in Oxfordshire has increased by 64% compared with 2014. Local renewable generation currently represents 15% of total local demand.[46] Several large solar farms are in the development stage, including Ray Valley Solar near Bicester, which will be the largest community-owned solar park in the UK. To meet the ambitious goal set out in Scenario C, local renewable generation would need to increase by between *3 and 4 times* as a proportion of total supply by 2030.

45 BEIS (2020), Renewable electricity by local authority 2014–2019. The different figures for generation vs capacity reflect the lower capacity factor of solar relative to wind power.

46 Based on comparison of datasets: BEIS (2020), renewable electricity by LA 2014–2019, and BEIS (2019) Regional and local authority electricity consumption statistics.

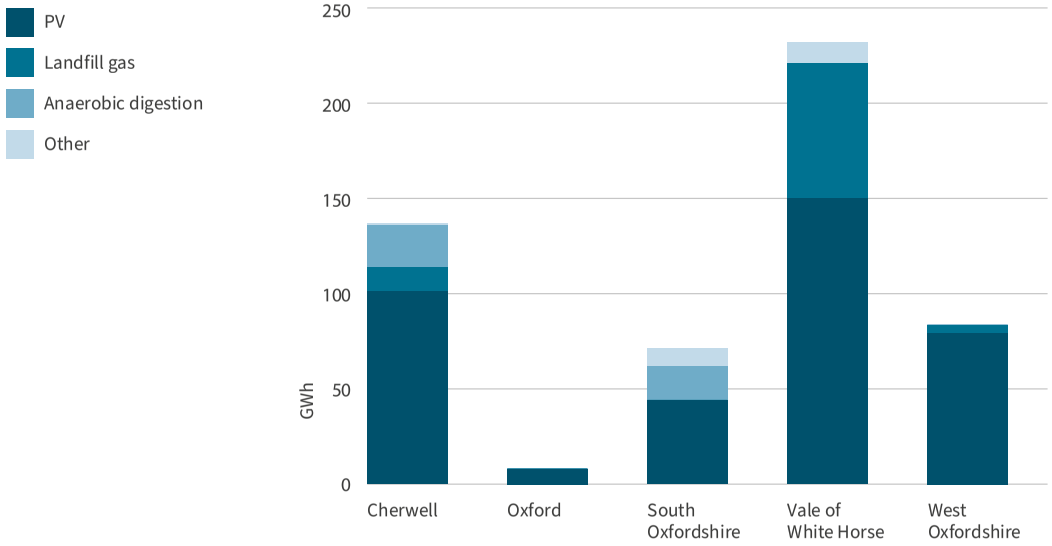



**Figure 3.6: Renewable electricity generation (GWh) by source, 2019**

However, since 2014, there have been significant developments in the UK's electricity mix. Notably, the cost of offshore wind turbines has fallen sharply, and the UK now has 10GW capacity, with a target of 40GW by 2030 announced as part of the government's '*Build Back Greener*' initiative. Drawing on the analysis behind Scenario C, the Oxfordshire Energy Strategy recommends that the county should aim to generate 56% of its electricity demand from local renewables by 2030. However, based on developments in clean energy supply at the national level, forthcoming interconnector capacity and higher projections for electricity demand, it may be reasonable for Oxfordshire to meet a lower proportion of its electricity demand from local sources than set out in Scenario C, relying on zero carbon supply from elsewhere to achieve net-zero emissions.

In the following chapter, our scenarios provide updated estimates, with the most ambitious equating to 31% of demand by 2030, and 52% by 2050. In any case, if Oxfordshire is to substantially increase the proportion of electricity demand met with local renewables before 2030, there is a need for improved public funding for new solar generation and electricity storage, and additional support for local energy markets.

Evaluating progress on the renewable generation of **heat** is difficult, as data is not collected on the number of biomass boilers, wood-stoves and heat-pump installations, nor their annual generation. However, BEIS do record the total number of domestic installations supported by the Renewable Heat Incentive (RHI), which for Oxfordshire amounts to 1,366, the majority of which are air-source heat pumps (63%) and ground source heat pumps (17%). This represents just 0.5% of all households, indicating that progress on renewable heat has been insufficient. Data is more readily available for the non-domestic sector, which has an installed capacity of 46MW, most of which is biomass.

The most ambitious estimates for decarbonising heat in the 2014 report involved a combination of reduced demand, the widespread roll-out of heat pumps and biomass systems, and utilising heat from anaerobic digestion (AD) plants. As of 2020 however, all heat generated from AD and waste processing plants continues to be unutilised, although the feasibility of using waste heat from the Ardley Energy Recovery Facility has been explored.[47] It is clear that Oxfordshire is not on track to meet 40% of its heat demand from local renewables and that decarbonising heat is one of the most difficult challenges facing the UK in its efforts to reach net-zero. It is hoped that the government's forthcoming Heat and Building Strategy and Future Buildings Standard will provide the policy framework for accelerating progress in this area.

47 BEIS (2019), Heat Networks: 2019 Q2 Pipeline, p70.

**Natural environment**. Land use in Oxfordshire is changing due to a number of factors. Housing and other development has led to the loss of arable and improved (intensively managed) grassland, but also to the loss of some areas of semi-natural grassland, woodland, scrub, wetland and urban trees and green spaces. In addition, pasture is being converted to arable land in some areas, and vegetation is under stress from climate change. These changes result in loss of the carbon stored in soil and vegetation, as well as loss of the future ability to sequester carbon. For example, from analysis of OS Mastermap we estimate that approximately 2,700 ha of land was sealed due to development between 2014 and 2020. Even if this land was all arable (with relatively low soil carbon), around 180,000 tonnes of carbon stored in the topsoil would have been lost. Although intensively cultivated arable land is a net source of greenhouse gas emissions, its loss will simply displace those emissions as food is produced elsewhere instead, unless demand for farmland is reduced by dietary change or a reduction in food waste.

New developments may plant trees in an effort to partly offset these impacts, but it takes many decades for new trees to reach maturity, thus replacing the lost carbon. However, some land managers are also demonstrating how regenerative agriculture, organic farming, agroforestry and habitat restoration can increase carbon storage and sequestration at the same time as supporting biodiversity and providing other societal benefits (see Chapter 9).

# 4 Scenarios for a zero-carbon Oxfordshire

There is widespread agreement on the need to drive down emissions and achieve a zero-carbon economy in Oxfordshire by 2050. However, this will not occur without concerted action at multiple scales and by diverse actors. Although Oxfordshire is reliant to a large extent on transformations at the national or even international level to decarbonise its electricity and transport systems, and to eradicate emissions from its building stock, the county also has the option to lead the way towards drastic emissions reductions, going further and faster than other parts of the UK.

This chapter sets out three different pathways to achieving zero-carbon (**Societal Transformation**, **Technological Transformation** and **Oxfordshire Leading the Way**), and contrasts these with a business-as-usual scenario (**Steady progression**). The chapters which follow provide further detailed analysis of the changes needed to achieve net-zero.

## 4.1 Methodology and approach

Our scenarios build on comprehensive modelling undertaken by the National Grid (NG) in developing their *Future Energy Scenarios* (FES). The four scenarios in this report align with their 2020 FES, which have also been adapted by the electricity Distribution Network Operator covering most of Oxfordshire: Scottish and Southern Electricity Networks (SSEN), to create the Distribution Future Energy Scenarios (DFES). To differentiate between our scenarios and those set out by NG, we have chosen slightly different names for each of the three pathways to zero-carbon.

Where available for Oxfordshire, data on key indicators such as energy demand, renewable generation, and the uptake of electric vehicles have been used as a starting point and combined with modelling by NG to extrapolate figures for 2030 and 2050. However, population growth on a national scale is forecast to be far more modest than in Oxfordshire. We have therefore adjusted the underlying calculations based on expected growth in housing and population, which are consistent across the four scenarios. Further, the NG FES analysis was conducted before the government brought forward the ban on new petrol and diesel vehicles to 2030, so our projections of EV uptake are more rapid.

None of the scenarios should be interpreted as forecasts or predictions, but instead outline different possible pathways to decarbonising the economy, indicating the scale of investment, societal and technological change needed to meet climate goals. The approach in this report differs from that taken in 2014, which included just one scenario with the level of action needed to meet UK climate goals. This time, three of the four scenarios achieve net-zero by 2050, varying in the extent of social and lifestyle change, technology mixes and local action. However, it should be highlighted that each of these pathways require change across all sections of society, driven by strong policy and public support at the national and local levels.

### Housing and population growth projections

Oxfordshire's population is growing rapidly. Up to 2031, the figures in this report are based on data compiled by Oxfordshire County Council's Research & Intelligence team, using housing data forecasts provided by City and District Councils. These figures indicate an average of just under 6,000 new homes added to the dwelling stock each year to 2031. Thereafter, no plans have yet been agreed, and for our scenarios we have assumed an additional 4,000 homes are built each year from 2031 to 2050.

All modelling is subject to uncertainty and error. Future energy scenarios have a tendency towards emphasising technological solutions with a focus on supply,[48] underplaying the significance of economic, social and behavioural drivers of energy demand. Models often make broad assumptions about high levels of energy service demand, characterised by thermostat settings and transport preferences. Ecosystem services and consumption emissions are often treated separately. In response, we have adapted our scenarios to include some additional, difficult-to-quantify, features of a zero-carbon future, with a focus on the demand side.[49]

Although the COVID-19 pandemic led to significant reduction in energy demand during 2020, we have not included this in our underlying calculations. There is limited recent data available at the geographical scale needed, and it is difficult to predict the near term rebound in energy consumption, travel behaviour and associated carbon emissions. While this is a limitation of these scenarios, the uncertainties associated with decadal trajectories outweigh near term fluctuations.

## A note on local renewable generation

Our 2014 scenarios included metrics relating to the proportion of electricity and heat demand generated by local renewable sources by 2030. The figures of 56% and 40% respectively were incorporated into the Oxfordshire Energy Strategy as recommendations of what might be needed to halve emissions by 2030.

As mentioned in Chapter 3 and discussed further in Chapter 8, recent developments and future projections indicate that this figure for electricity now represents a highly ambitious pathway. Whereas in 2014, Scenario C assumed significant development of onshore wind in the county, in this report we focus primarily on solar photovoltaics for new local electricity generation, for reasons outlined in Chapter 8.

For heat, we are no longer using the indicator: '*renewable heat as a percentage of total heat demand*'. This is partly because it is becoming apparent that, besides improving building insulation, heat pumps will drive the decarbonisation of heating in Oxfordshire, and it is a matter for debate whether these represent local generation or energy efficiency. We have replaced this metric with a simpler indicator which is also used in national policy: the number of heat pumps installed per year. We also include indicators for natural gas and hydrogen demand.

48 Barrett et al (2019). Modelling Demand-side energy policies for climate change mitigation in the UK: A rapid evidence assessment. UKERC Working Paper.

49 It is worth noting that National Grid and other modellers such as the Climate Change Committee have been increasingly including social, cultural and behavioural factors in their scenarios. Our scenarios for Oxfordshire go even further.

## 4.2 Scenarios

### Steady Progression

Steady Progression extrapolates from trends on emissions reductions. It incorporates recent policy announcements such as the ban on sales of new petrol and diesel vehicles, but progress is uneven across sectors, and it does not achieve net-zero by 2050.

In this scenario, Oxfordshire continues to rely on high levels of natural gas for **heating**, with demand for gas falling by only 6% by 2050. The deployment of heat pumps is gradual. Overall energy demand continues to fall but at a more modest rate due to minimal increases in energy efficiency in buildings and industry.

In **transport**, the majority of small private vehicles are electrified, although some plug-in hybrids remain on the roads. The numbers of people working from home on a regular basis continues to gradually increase from the pre-pandemic baseline, but this results in minimal reduction in vehicle mileage as home-workers substitute commutes for other local trips.[50] Demand for train commuting is reduced however. Railway electrification is achieved for the new East West Rail route, but rising costs hamper progress on the main routes through Oxford. There is more progress in electrifying buses, but this fails to attract many new passengers switching from private transport. Rates of walking and cycling remain low as a proportion of total trips, and cycling culture fails to take hold outside of Oxford City as new housing continues to be built at low densities. HGVs become cleaner by switching to gas, but continue to rely on fossil fuels. Hydrogen does not feature significantly as a fuel for either transport, heating, or energy storage.

**Electricity demand** remains steady to 2030, and then increases by 74% to 2050 (compared with 2018), driven by substantial housebuilding. It is assumed that from 2025 heat pumps are installed in all new homes, and from 2028 their occupants own one electric vehicle, which they charge at home. **Flexibility** is minimal, with limited smart charging practices and vehicle-to-grid (V2G) deployment. The adoption of flexible practices by householders and businesses remains a niche activity in the near term, but time-of-use tariffs become more widely adopted (54%) by 2050. 60% of electricity generation is provided by renewables by 2030, but most of this is provided by technologies deployed outside of Oxfordshire. Nonetheless, falling prices and increased efficiency lead to an increase in **solar generation** of 32% by 2030 (500 GWh), and 131% by 2050 (880 GWh). Installed capacity of solar reflects the current share of 80% ground mounted, 20% rooftop. However, as electricity demand increases, the proportion supplied by local renewables rises only slightly to 16%, and that remains constant as new installations keep track with growing electricity demand.

In this scenario, in line with recent trends, **land use** is largely unchanged except for the continued loss of farmland for housing development. Over 9,000 ha of land (3.5% of the area of Oxfordshire) is allocated for development between 2011 and 2031. Solar farms expand to occupy an additional 670 ha of farmland. Around half of the land in the county continues to be dedicated to livestock farming, with 27% remaining as intensive pasture (improved grassland), and approximately half of the 43% arable land being used to produce livestock feed. Modest habitat restoration efforts are linked to new biodiversity net gain policies, though these are hampered by intense competition for land.

50 Hook, A., Court, V., Sovacool, B.K. & Sorrell, S. (2020). A systematic review of the energy and climate impacts of teleworking. *Environmental Research Letters*, 15: 093003

## Societal Transformation

This pathway to a zero-carbon economy is driven by significant changes in consumer practices.

Total energy demand falls significantly in this scenario, with a national programme of retrofit leading the way to achieving high levels of efficiency across Oxfordshire's building stock. **Electricity demand** more than doubles by 2050 compared with 2018, driven by the large-scale deployment of heat pumps to replace gas and oil boilers throughout Oxfordshire. Reflecting this, demand for natural gas falls by 31% to 2030, and by 2050 to zero. From 2025, no new homes in Oxfordshire would be connected to the gas grid, but from 2035, some areas of the county's gas grid are repurposed for **hydrogen**.

In this scenario, Oxfordshire maintains its 3% share of UK **solar capacity**. This means more than doubling generation by 2030 (850 GWh) and achieving more than 5 times current levels by 2050 (2,100 GWh). In this scenario, the proportion of rooftop solar grows to 25% of installed capacity. Combined with relatively small contributions from landfill gas, anaerobic digestion and biomass, local renewable generation represents 27% of Oxfordshire's electricity demand in 2050.

**Flexibility** is a major feature of electricity demand, with Oxfordshire's residents playing a crucial role in balancing the electricity grid to maximise the usage of renewable power. In 2030, 29% of households have adopted time-of-use tariffs which incentivise flexible usage, and by 2050 this rises to 73%. Oxfordshire's increasing number of electric vehicles owners adopt smart charging practices, and V2G technology is deployed across 3% of households by 2030, rising to 26% by 2050. Electricity storage in this scenario is largely decentralised, with building-scale batteries coupled with rooftop solar installations, and a role played by aggregators to harmonise their operation at a neighbourhood scale, such as trialled in Project ERIC.[51] Flexibility is also enabled by a substantial increase in remote working, allowing householders greater opportunity to avoid and shift their demand for travel.

A transformation in mobility takes place, as changing travel habits during the COVID-19 pandemic are incorporated into everyday life. Overall **transport** energy demand is reduced, with significant increases in walking and cycling for shorter trips and widespread home working. Incentives and communications campaigns are needed to drive up the use of public transport following the pandemic. These changes are also driven by bold policies such as the implementation of low traffic neighbourhoods, concentrating new housing in mixed-use development at higher densities, and restrictions on vehicular access to town centres. EV adoption is rapid supported by local, shared public charging facilities, and larger proportions of heavy vehicles including buses and HGVs are electrified than in other scenarios. In this pathway, modal shift drives up train usage and investment. All railway lines in Oxfordshire are fully electrified by 2050.

51 Project ERIC ran from 2015–2017 in Rose Hill, East Oxford.

In **Societal Transformation**, greenhouse gas emissions from **land use** are reduced as the result of the widespread adoption of low-meat diets.[52] This reduces the demand for pasture and arable land for livestock feed, freeing up more space for restoration of native woodland, floodplain meadows and wetlands. In addition, less land is taken for new housing due to strong planning guidance that encourages compact development, together with lower reliance on private cars which reduces the space needed for parking. As a result, the target to double Oxfordshire's woodland is achieved, including through integrating new native woodland planting and regeneration into the Nature Recovery Networks along with restoration of natural grassland, wetland, heathland and shrub. Attractive green travel routes are also integrated into these networks and into new developments, further boosting the number of people choosing to use active travel. Agriculture diversifies, including more horticulture and agroforestry, and a wider variety of food is produced for local consumption. Farmers lead the way in enhancing biodiversity and improving soil quality, including planting and expanding hedgerows, leading to co-benefits for natural flood management, water quality and other ecosystem services.

52 The National Grid Future Energy Scenarios do not provide detail on dietary change, however the Committee on Climate Change's 'Balanced Pathway' involves a 20% shift away from red meat and dairy products by 2030, with a further 15% reduction of meat products by 2050 and their Widespread Engagement pathway has a 50% reduction in meat. Sixth Carbon Budget, p165. Our Societal Transformation scenario sees a 75% reduction for meat but no reduction for dairy, based on a low carbon version of Public Health England's Eatwell Plate.

## A note on negative emissions and offsetting

For a single county embedded in a national energy and transport system, it is difficult to define and quantify carbon offsetting. Typically this is defined as carbon mitigation or sequestration measures taking place outside a defined boundary, with a need for evidence to prove that the carbon reductions would not have occurred without additional investment and intervention. If we were to draw a boundary around Oxfordshire, then decarbonisation efforts elsewhere in the UK could be defined as offsetting. New installations of renewable generation such as offshore wind could be classed as offsetting Oxfordshire's emissions, as the county benefits from the zero-carbon electricity produced.

Another way to define offsetting might be to refer to negative emissions technologies and nature-based solutions for sequestering carbon remaining from difficult-to-decarbonise sectors such as aviation and shipping. Options include bioenergy with carbon capture and storage (BECCS), Steam Methane Reforming with CCS (to produce hydrogen), and nature-based solutions including afforestation and ecosystem restoration. Although their scenarios rely on negative emissions to achieve net-zero, the National Grid do not rely on negative emissions from overseas.

For clarity and simplicity, we do not refer to mitigation or negative emissions activities conducted outside Oxfordshire as offsetting. We follow NG in planning for net-zero to be achieved within the UK territory, but acknowledge that Oxfordshire will rely on action taken elsewhere. The extent to which it does varies amongst the three net-zero scenarios, including the deployment of solar photovoltaics, and the quantities of biofuels grown as feedstock for electricity generation in BECCS power plants outside of the county.

## Technological Transformation

This pathway to zero carbon emissions relies on the widespread deployment of existing technologies and the development of new innovations and infrastructures. Although the means by which Oxfordshire's residents travel and heat their homes are transformed, their practices and behaviours undergo less change, and demand for energy services continues to increase. Of the three net-zero pathways, Oxfordshire is most reliant on technologies developed and deployed outside of the county.

In this scenario, **hydrogen** features prominently as a fuel for heating, energy storage, industrial processes and heavy vehicles. It is deployed rapidly with 110 GWh used in 2030, rising to levels of annual demand in 2050 (5,300 GWh) which roughly equates to current usage of natural gas. Natural gas demand falls less steeply than in the other zero-carbon scenarios, as hybrid boilers are rolled out, ready for sections of the grid to be switched from natural gas to hydrogen. At the national scale, natural gas demand remains high in this scenario, as it becomes the primary means by which hydrogen is generated, accompanied with carbon capture and storage technology. However, it is very unlikely that these conversions take place in Oxfordshire, so natural gas demand falls to zero by 2050.

Although the widespread uptake of electric vehicles drives **electricity demand** up (+84% by 2050), this is substantially lower than in other net-zero pathways, due to less electrification of heat. This is reflected in the lower numbers of **heat pumps** installed in this scenario, although even here the number of homes heated with electricity doubles by 2050. The high costs associated with the shift from natural gas to hydrogen are somewhat offset by efficiency improvements in **buildings**, although ambition on energy efficiency in buildings is lower than in other net-zero scenarios.

Although new homes continue to be connected to the gas grid beyond 2025, policy requires that boilers are hydrogen-ready by this date to facilitate a fuel-switch at a later date.

The proportion of **electricity demand** met by local renewables is slightly lower than in the **Societal Transformation** pathway, as a result of relatively lower uptake of rooftop solar as opposed to ground-mounted. As such, the proportion of rooftop solar falls from 20% to 10%, as large-scale ground mounted installations are preferred. At a national scale, new electricity generation is dominated by wind power, but this is not widely deployed in Oxfordshire. The county retains a 3% share of UK solar capacity, and 23% of electricity demand is met by local sources of generation by 2050.

**Flexibility** features less prominently in this scenario than other zero-carbon pathways, as consumers are more reluctant to shift the times of day when they travel, charge their EVs or carry out energy intensive activities such as laundry, cooking or electric heating. The proportion of households on time-of-use tariffs is only 10% in 2030, rising to 60% by 2050; while uptake of V2G is negligible in 2030, rising to only 11% of car owners in 2050. Technological solutions, as opposed to changing practices, deliver a larger share of the flexibility needed to balance energy supply and demand, and this scenario includes the development of a new 10MW hydrogen peaking plant in Oxford.[53] Learning from the process of installing of a 50MW hybrid battery on the transmission grid as part of Energy Superhub Oxford, a further 50MW storage capacity is deployed to ease constraints elsewhere in the county.

53 This is included in SSEN's future scenarios.

**Transport**. In this scenario, the electrification of the private vehicle fleet takes place on roughly the same timescale as in **Societal Transformation**, driven by the ban on sales of new fossil fuelled vehicles by 2030. However, growth in public transport use is slower than in other net-zero scenarios due to lower willingness amongst the public to switch away from private modes. As a result, congestion remains a significant issue in the county, with active modes, public transport and remote working only partially offsetting the growing number of trips taken by private car. With car usage remaining high, this scenario requires the most extensive public charging infrastructure and rapid charging is in high demand, but the uptake of V2G by Oxfordshire's EV owners is modest. Both trends drive the need for investment in electricity grid capacity. Although progress is made to electrify railways in Oxfordshire, some routes switch to hydrogen in this scenario. Hydrogen is the fuel of choice for heavy vehicles.

In this scenario, **agricultural** production is intensified in Oxfordshire, with a larger number of farmers moving to horticulture practices using polytunnels and indoor hydroponics. Intensification is further assisted by technological innovations as automated mechanical weeding, the widespread use of GPS and in some cases, machine learning.[54] As such, levels of food production increase despite some agricultural **land** being allocated for afforestation and solar farms. This scenario features a narrow focus on planting trees, ignoring the value of other habitats and the importance of planting the right trees in the right place. As a result, there are fewer co-benefits for biodiversity or ecosystem services than the other two net-zero pathways, and even some adverse impacts as non-native trees are planted on biodiverse and carbon-rich grassland. Also, without dietary change to free up farmland, and with less compact housing developments, competition for land means that tree planting targets are not achieved.

54 Liakos, K.G., Busato, P., Moshou, D., Pearson, S. & Bochtis, D. (2018). Machine learning in agriculture: A review. *Sensors,* 18: 2674. doi: 10.3390/s18082674

## Contributions from the non-domestic sector

As discussed in Chapter 7, the non-domestic sector in Oxfordshire is extremely heterogenous. With more than 32,000 businesses in the county, there is significant variation in the design, fabric and usage of buildings, as well as the business activities taking place within. Whereas for domestic buildings, the number of homes retrofitted to certain standards of energy efficiency is a useful measure of progress, we have used alternative metrics for the non-domestic building stock, focusing instead on the steps taken by businesses to reduce emissions.

There are a wide variety of resources to help organisations develop plans to achieve net-zero. Oxfordshire businesses Seacourt Printers and Anne Veck have developed action packs to support other businesses on their sustainability journeys, while colleagues at Oxford University have helped to launch the SME Climate Hub a repository of advice and resources. Energy Solutions Oxfordshire is a new energy services company launched by the Low Carbon Hub and Oxford Brookes to provide a one-stop shop for businesses to reduce energy wastage.

There are a wide variety of steps that businesses can take to reduce their carbon footprints, and we have selected metrics which will help to indicate that Oxfordshire's business community is taking seriously their responsibility to tackle climate change, by monitoring their impact, developing and publishing net-zero strategies, and taking part in zero carbon networks.

## Oxfordshire Leading the Way

In this scenario, Oxfordshire goes further and faster than other areas of the UK in achieving zero carbon emissions. This is driven by high levels of public support for local action and strong policy, as well as lifestyle change amongst householders and communities. Oxfordshire builds on its leadership position in the low carbon sector by attracting investment in clean-tech innovation, and expanding community initiatives and the sharing economy.

**Oxfordshire Leading the Way** balances the need for societal change and technological innovation represented in the two other zero-carbon scenarios. **Heat pumps** are deployed rapidly in Oxfordshire, alongside a transformative retrofit scheme. The retrofit market is assumed to take several years to create, so numbers start small and build up to market maturity in the 2030s. By 2050 it is assumed that 95% of today's housing stock (280,000 properties) have been renovated to a high standard of efficiency. In Oxfordshire no new gas boilers are installed across the building stock from 2025.

Driven by the rapid deployment of heat pumps and electric vehicles, **electricity demand** in this scenario follows the steep trajectory outlined in **Societal Transformation**. Building on the successful trials of markets for flexibility services in Project LEO, businesses and residents actively engage in **flexibility** practices, saving on energy bills and assisting with grid balancing. **Hydrogen** in this scenario is adopted primarily for heavy vehicles and energy storage, with a small amount generated locally using electrolysis.

This scenario involves a moon-shot for the deployment of **solar photovoltaics**. Oxfordshire's share of UK capacity increases to 4% by 2030, and 6% in 2050. This equates to a *three-fold* increase in solar capacity in the county by 2030 compared with 2019 figures, and *ten-times* by 2050. Accelerated rooftop installations play a key role in achieving these increases, and new-build dwellings include an average of 4kW capacity from 2023. In the medium term (2030), the proportion of rooftop solar increases to 40% of installed capacity, but as the availability of suitable rooftops diminishes and large ground-mounted arrays are constructed, this falls back to 30% by 2050. As a proportion of Oxfordshire's electricity demand, renewables provide 31% in 2030, and 52% in 2050.

Energy demand associated with **transport** falls following the COVID-19 pandemic, as Oxfordshire residents incorporate walking and cycling into their daily routines, with more amenities being provided locally, and businesses support remote working. Reduced car-usage is also driven by extensive pedestrianisation measures implemented by Oxford City and the market towns, workplace charging levies, the proliferation of low traffic and higher density neighbourhoods, and the expansion of shared transport options. Vehicle electrification occurs more rapidly than in other net-zero scenarios, and sharing business models, including autonomous fleets, are pioneered in Oxfordshire, driven by a thriving automotive sector. This leads to reduced car ownership. Freight consolidation centres and other localised warehousing and production enable low carbon local delivery of goods throughout urban areas.

Oxfordshire's **land**-based resources play a critical role in supporting decarbonisation efforts at the national scale. This means that a greater proportion of land is allocated for growing bioenergy crops than in other net-zero scenarios, used for power generation, aviation and shipping. The proportion of land currently used for meat and dairy production is reduced as a result of changing diets to make way for bioenergy crops, ecosystem restoration and solar arrays. Solar farms are built throughout the county, but still only occupy less than 1% of land area. Agriculture diversifies and a wider variety of food is produced for local consumption. Permaculture practices are pursued, and the number of allotments in Oxfordshire triples. New local initiatives such as community gardens, farmers markets and land trusts crop up around Oxfordshire. Membership of Good Food Oxford and the Community Action Network quadruples by 2030.

### Quality vs quantity

The nature of scenario modelling means that the focus is inevitably on **quantity**: adoption of heat pumps and EVs, numbers of homes retrofitted, businesses conducting energy audits and hectares of trees planted.

Although more difficult to capture in scenario modelling, **quality** is crucial. The 'performance gap' describes the difference between actual and modelled energy usage for buildings, and can be as high as 60% in low energy housing.[55] An integrated approach to quality assurance (such as the systems and standards advocated by the Passive House Institute) is needed to get real-life energy performance down to the levels assumed in the quantitative analysis. Similarly, householders' capacity and willingness to shift their electricity demand matters just as much as the numbers adopting time of use tariffs and V2G technology. Businesses may conduct regular energy audits and monitor their carbon footprint, but acting on this information is what counts. Finally, hectares of trees planted per year is a crude measure, which ignores the importance of selecting species which enhance biodiversity and provide additional ecosystem services besides carbon sequestration, as well as the need to restore a balanced mix of different habitats.

Ultimately, what counts towards climate goals is actual, observed emissions reductions, rather than the number of homes renovated, trees planted, heat pumps installed or EVs registered. The difference between modelled and observed outcomes depends on the quality of design and workmanship, the performance of installed technologies, and user preferences and behaviour.

55 Gupta, R., Howard, A., Kotopouleas, A. & Krishnan, S., 2019. Meta-study of the energy performance gap in UK low energy housing. In: ECEEE Summer Study Proceedings. Presented at the ECEEE, Belambra, Presquile de Giens, France.

| Scenarios | Steady Progression | | Societal Transformation | | Technological Transformation | | Oxfordshire Leading the Way | | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Indicator | 2030 | 2050 | 2030 | 2050 | 2030 | 2050 | 2030 | 2050 | |
| **Buildings** | | | | | | | | | |
| No. of pre-2020 homes renovated | 3,000 | 30,000 | 8,900 | 280,000 | 3,000 | 150,000 | 8,900 | 280,000 | Supply chains and governance arrangements will take 5–10 years, so little change before 2030.[56] |
| Energy standard for retrofits, kWh/m$^2$/year (useful energy; domestic space heating only) | 100 | 100 | 100 | 60 | 100 | 100 | 100 | 60 | |
| Average EPC rating for all buildings | D | D | D | B | D | C | D | B | Current average is D; improvement requires support to achieve higher ratings and a regulatory minimum standard to make low-rated buildings unusable (with finance and other support for upgrades). |
| Percentage of Oxfordshire businesses conducting annual carbon footprints and/or energy audits | 3% | 6% | 15% | 80% | 10% | 40% | 20% | 80% | Figures refer to businesses with employees (excludes sole traders) |
| Proportion of large businesses with published net-zero strategies | 5% | 30% | 60% | 95% | 30% | 60% | 70% | 100% | |
| Coverage of business networks dedicated to achieving zero-carbon (% of total number of businesses) | 3% | 10% | 20% | 40% | 5% | 15% | 25% | 50% | Examples include Zero Carbon Oxford Partnership and Oxfordshire Greentech, but more are needed. Figures exclude sole traders. |
| **Heat** | | | | | | | | | |
| Natural Gas demand (GWh) | 4,800 | 4,900 | 3,600 | 0 | 4,300 | 0 | 3,300 | 0 | Demand in 2018 was 5,270 MWh |
| Hydrogen demand (GWh) | 20 | 160 | 19 | 1,600 | 110 | 5,300 | 30 | 1,800 | Currently negligible. |
| Number of heat pumps (total installations) | 41,000 | 190,000 | 120,000 | 390,000 | 64,000 | 250,000 | 130,000 | 390,000 | There are roughly 1,500–2,000 heat pumps in Oxfordshire currently. |

56 Construction Leadership Council (2020), Greening our existing homes national retrofit strategy.

| Scenarios | Steady Progression | | Societal Transformation | | Technological Transformation | | Oxfordshire Leading the Way | | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Indicator | 2030 | 2050 | 2030 | 2050 | 2030 | 2050 | 2030 | 2050 | |
| **Transport** | | | | | | | | | |
| Battery electric vehicles as proportion of all light vehicles on the road | 25% | 95% | 37% | 99% | 35% | 99% | 40% | 99% | Currently <1% |
| Number of battery electric vehicles (BEVs) | 130,000 | 600,000 | 195,000 | 500,000 | 185,000 | 525,000 | 210,000 | 450,000 | There are roughly 430,000 vehicles in Oxfordshire currently, of which 2,500–3,000 are BEVs. |
| Domestic and workplace charge points | 80,000 | 200,000 | 68,000 | 165,000 | 74,000 | 175,000 | 58,000 | 150,000 | There are roughly 2,000 to 2,500 chargers currently. |
| Public charge points | 7,000 | 18,000 | 10,000 | 25,000 | 15,000 | 26,000 | 16,000 | 36,000 | There are roughly 240 public chargers currently. Includes shared residential charge points (e.g. on street). The European Commission recommends 1 public chargepoint is installed for every 10 EVs on the roads.[57] |
| % Telecommuting | 10% | 15% | 30% | 40% | 10% | 20% | 25% | 35% | Defined as percentage of labour force working primarily from home. In 2019, about 5% of those in employment in the UK said they mainly worked from home, although this rose to 47% during the first lockdown in April 2020. |
| Active travel investment | £10 | £15 | £20 | £40 | £15 | £30 | £25 | £40 | Per capita, per year, including capital and revenue based on 2021 prices. In 2018/19 active travel investment averaged £6 per person.[58] |
| **Electricity supply** | | | | | | | | | |
| Solar generation (GWh) | 500 | 880 | 850 | 2,100 | 700 | 1,400 | 1,100 | 3,900 | Solar generation was 382 GWh in 2019.<br>In ST and TT, solar capacity remains 3% of UK total. In OLTW, this increases to 4% by 2030 and 6% by 2050. |
| Total renewable electricity supply (GWh) | 660 | 1,000 | 1,000 | 2,200 | 870 | 1,500 | 1,300 | 4,000 | Renewable generation was 533 GWh in 2019. |

57 Transport & Environment (2018), Roll-out of public EV charging infrastructure in the EU.

58 Cycling and walking investment strategy Report to Parliament, p24. February 2020.

| Scenarios | Steady Progression | | Societal Transformation | | Technological Transformation | | Oxfordshire Leading the Way | | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Indicator | 2030 | 2050 | 2030 | 2050 | 2030 | 2050 | 2030 | 2050 | |
| Renewable electricity supply as a percentage of electricity demand | 16% | 16% | 25% | 27% | 23% | 23% | 31% | 52% | Current renewable electricity generation represents 15% of demand |
| **Flexibility** | | | | | | | | | |
| Percentage of households with time-of-use (TOU) electricity tariffs | 6% | 54% | 29% | 73% | 10% | 60% | 35% | 83% | Flexibility figures are taken directly from National Grid's 2020 scenarios. Currently <1%. |
| Percentage of households utilising vehicle to grid technology | 0% | 5% | 3% | 26% | 0.2% | 11% | 5% | 45% | Percentage of all households, although not all own vehicles, nor have access to off-street parking. |
| **Land use** | | | | | | | | | |
| Hectares of trees planted per year | 60 | 60 | 430 | 430 | 210 | 210 | 430 | 430 | Tree planting is enabled by dietary change in ST and OLW. |
| Hectares of agroforestry, hedgerows and garden trees planted per year | 0 | 0 | 1,400 | 1,400 | 0 | 0 | 1,400 | 1,400 | Farmer and community participation enables additional tree planting in ST and OLW. |
| Hectares of natural grassland, heath, scrub and wetland restored per year | 5 | 5 | 400 | 400 | 0 | 0 | 200 | 200 | ST aims to double the area of non-woodland semi-natural habitats from 4.5% to 9%. OLW is constrained by heavy demand for land for solar and biofuels. |
| Percentage of land used for ground-mounted solar generation | 0.15% | 0.26% | 0.23% | 0.57% | 0.24% | 0.45% | 0.23% | 0.99% | This is calculated based on an area for Oxfordshire of 260,500 ha (2,605 $km^2$). |
| Hectares of land used for bioenergy crops | 0 | 0 | 10,000 | 10,000 | 20,000 | 20,000 | 25,000 | 25,000 | All scenarios include less than the NG's estimated need for bioenergy, due to land use constraints. The remainder must be grown elsewhere in the UK or imported. ST relies on demand reduction to reduce need for BECCS. |
| Percentage of food demand met in Oxfordshire | 60% | 40% | 95% | 60% | 55% | 39% | 87% | 55% | Based on area needed to produce food with an equivalent calorific value. Currently Oxfordshire meets the equivalent of 74% of its food demand. This increases with low meat diets but decreases over time with high population growth and loss of farmland for housing, afforestation, biofuels and solar. |

## 4.3 Investment and economic impact

In a report for the Committee on Climate Change (CCC), Cambridge Econometrics estimated that GDP at a national level would be 2–3% higher between 2020 and 2050, and would generate around 300,000 additional jobs if the UK follows a path to net-zero.[59] Although the investments needed in developing and deploying the solutions for reducing carbon emissions are high, especially in the near term, they predict a net economic benefit.

The economic impacts of the transition are likely to be geographically uneven, and the CCC acknowledges that many jobs will be lost, for instance in the oil and gas sector. Oxfordshire's economy, which is already dominated by the service sector and high-tech manufacturing, stands to benefit substantially from this transition. However, to capitalise on this opportunity, there is a need for unprecedented levels of investment in transport, buildings and the energy system in Oxfordshire.

Based on available evidence and without using econometric modelling techniques, we have provided estimates of the additional investment needed to reach the 2030 goals outlined in **Oxfordshire Leading the Way**.

| | Investment 2021–2030 | Notes |
|---|---|---|
| **Transport** | | |
| Active travel | £100m | |
| Vehicle fleet decarbonisation | £240m | Majority of additional investment needed is focused on LGVs, HGVs and buses, as it is expected that the total cost of ownership for battery-electric passenger-cars equals or even undercuts current costs for conventional vehicles before 2030 |
| Electric charging infrastructure | £150m | Includes public and private |
| Rail electrification | £125m | Based on 50% of the non-electrified[60] multi-track line being electrified at an average cost per km of £1,750,000.[61] |

59 Cambridge Econometrics (2020), Economic impact of the Sixth Carbon Budget.

60 The stretch of mainline rail from Reading to Didcot has already been electrified, representing 10% of Oxfordshire's total railway.

61 Railway Industry Association (2019), Electrification cost challenge.

| | Investment 2021–2030 | Notes |
|---|---|---|
| **Buildings** | | |
| Housing retrofit and heat pumps | £1.5bn | Assumes that costs of (re-)training the workforce are met at national level as part of a strategic re-positioning of the economy to meet decarbonisation targets. Assume £25K per retrofit; £10K per HP. Majority of investment is private. |
| Business advice and engagement services | £50m | Assume a network of 100 decarbonisation consultants working with local businesses (upscaling OxFutures) @ £50K per consultant per year |
| **Renewable energy** | | |
| Solar generation | £630m | Based on CAPEX installation costs of £750/kWp and OPEX of £7000/MW/year. |
| Grid infrastructure | £450m | Based on £30bn UK CAPEX network investment in CCC's balanced pathway, scaled by Oxfordshire's forecast demand contribution. |
| Battery Storage (supply side) | £100m | Based on CAPEX installation costs of £500/kWe and OPEX of £25000/MW/year. |
| **Land use & natural ecosystems** | | |
| Strong planning policy | Low cost | Strengthen planning policy to protect carbon-rich habitats, encourage green roofs and rooftop solar, and mandate compact, walkable low carbon development. Green roofs expected to reduce building heating and cooling costs and walkable neighbourhoods expected to deliver healthcare savings. |
| Awareness raising to encourage low meat diets | Low cost | Expected to reduce healthcare costs |
| Tree planting | £113m | Planting 22,600 ha of tree and agroforestry cover by 2050 at £5000 per ha of cover.59 |
| Plant 8,500 km of hedgerows | £44m | Based on estimate of £526/100m for 8,500 km of species-rich hedge including hedgerow trees.[62] |
| Habitat restoration | £31m | Estimated £800 per ha for 9000 of meadows and £8000 per ha for 3000 ha of wetlands |

62 Warner, E (2020), Opportunities for biodiversity enhancement on the University Estate.

# 5 Catalysing low carbon innovation

Since the last Oxfordshire Low Carbon Economy report in 2014, much in the political, economic, and social spheres has changed, altering the conditions in which Oxfordshire's low-carbon economy grows.

This chapter starts with an overview of the strategic innovation assets Oxfordshire has and the business, technology and social innovation networks that support and connect those within the county's innovation ecosystem. This is followed by a wide-ranging summary of current activity to foster enterprise and innovation in Oxfordshire's low-carbon economy, looking at existing and planned Living Labs, which are large-scale, placed-based, collaborative and innovative pilot projects, and Oxfordshire's leading low carbon businesses. The chapter concludes with what is needed to ensure the prospering and scaling up of a healthy low-carbon ecosystem.

## 5.1 Oxfordshire's strategic innovation assets

Oxfordshire has one of the highest concentrations of innovation assets in the world,[63] positioned at the forefront of global innovation in transformative technologies and sectors such as autonomous vehicles, quantum computing, cryogenics, nuclear fusion, space and satellite technology, life sciences, and digital health. The county's business R&D spending is high, at £1,600 per capita (compared to £360 in London) – the seventh highest rate of 42 upper tier authorities.

Driving this innovation are the collection of nationally leading local authorities, research institutions, science, technology and business parks, business tech networks, a strong social enterprise sector, and community action groups. These include the two Oxford universities, Harwell Campus and Culham Science Centre in South Oxfordshire, business network B4, low-carbon business network Oxfordshire Greentech, Oxford Centre for Innovation, Oxfordshire Social Enterprise Partnership (OSEP) which support Oxfordshire's many successful social enterprises, the Community Action Group network's member organisations across the county, and many others.

63 OxLEP (2020), The Investment Plan.

Our universities are at the centre of Oxfordshire's innovation ecosystem. With the technology transfer expertise of Oxford University Innovation (OUI) and the business building expertise of Oxford Sciences Innovation plc, a science business builder devoted to building world-changing businesses and bringing Oxford science to the world faster, the University is by far the UK's most successful university start-up creator having spun out over 200 businesses to date (Figure 5.1). This figure is more than the combined output of University College London (46) and Imperial College (36) in second and third place.[64] Many of the projects & patents managed by OUI have had worldwide impact, such as the development of a new method of producing hydrogen instantly from fossil fuels with minimal oxygenated by-products.[65] Companies spinning out via OUI have attracted over £855m worth of external funding with 4,793 new patents under management.

Oxfordshire has several world leading science, technology and business parks, attracting innovation investment from central government and the private sector. Harwell Campus hosts both The Faraday Institution (in which central government has invested £65m), charged with tackling the global energy and battery storage challenge; and the Satellite Applications Catapult (in which central government has invested £68.3m), which advances innovation solutions in areas like sustainable development, agriculture, intelligent transport, geospatial intelligence and ubiquitous connectivity, through helping organisations make use of, and benefit from, satellite technologies.[66],[67]

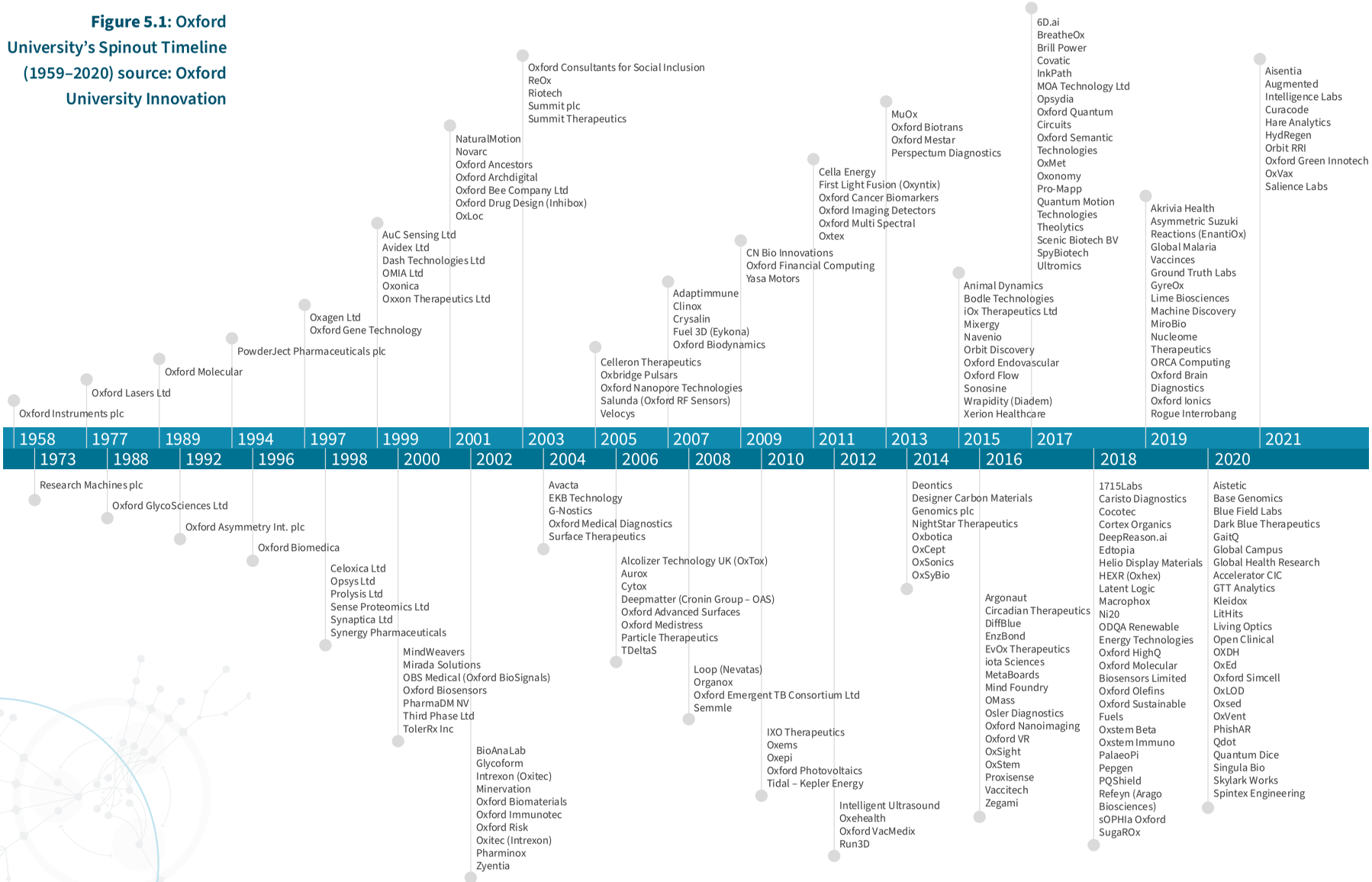
64 Advanced Oxford (2020), Powering up for the green recovery.

65 Oxford University Innovation

66 OxLEP (2019), Oxfordshire Local Industrial Strategy.

67 Satellite Applications Catapult (2021), About Us: The Satellite Applications Catapult.

**Figure 5.1:** Oxford University's Spinout Timeline (1959–2020) source: Oxford University Innovation



Energy innovation is a strength of the county. Harwell and Culham science parks in the south of the county grew out of the United Kingdom Atomic Energy Authority's (UKAEA) nuclear research dating back to the 1940s. Still a major international centre for nuclear fusion research, Culham is home to CCFE (Culham Centre for Fusion Energy)[68] which operates JET (Joint European Torus) and the MAST Upgrade experiment, supporting the first reactor-scale experiment, ITER, in France and beyond to the first fusion power plants. The EnergyTech Cluster at Harwell Campus facilitates collaboration across 57 organisations comprising over 1100 employees, with strong links to many more across the UK.[69]

Besides expertise long-established at Harwell and Culham, plans are now being developed for The Energy Systems Accelerator (TESA) to be located in Oxford. TESA is a proposed £100m national energy innovation hub, comprising offices, meeting rooms and laboratories, with shared spaces to promote interaction and creativity. The building will house research groups, businesses, spinout companies, public sector innovation teams and community energy groups. Although final decisions have yet to be made, Government has already approved funding for a 'mini-TESA' in Osney Mead.

Local government in Oxfordshire also provides vital resources, support, and leadership in the low-carbon innovation space. Oxfordshire County Council have one of the largest local government innovation teams in the UK, involved in over 60 collaborative projects, and have helped leverage £135m in R&D funding into county projects. Collaborating extensively with businesses and research institutions, their Innovation Hub (iHub) portfolio of projects includes connected and autonomous vehicles, innovative planning, health and care, integrated mobility, electric vehicles, green fuel and smart cycling.

68 Culham Centre for Fusion Energy.

69 Harwell Campus EnergyTech Cluster.

**Figure 5.2:** Oxfordshire's low-carbon innovation ecosystem

### Funding and investment
- Better Business Finance
- British Business Investment
- Green Investment Bank
- Innovate UK
- Oxford Investment Opportunity Network
- OxLEP
- Oxfutures
- Oxford Science Innovation
- Shared Prosperity fund
- Venture Capital firms

### Low carbon clusters
- Abingdon Science Park
- Culham Science Centre
- Begbroke Science Park
- Harwell Science and Innovation Campus
- Howberry Park
- Milton Science and Business Park
- Oxford Centre for Innovation
- Oxford Science Park
- Oxford Technology Park
- Oxford Industrial Park

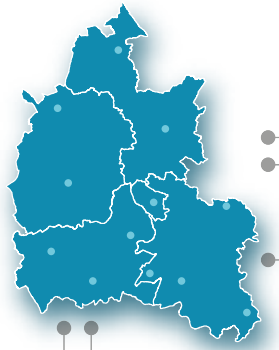
### Networks
- Advanced Oxford
- Harwell Green Club
- Oxford Academic Health Sciences Network
- Oxfordshire Greentech
- Zero Carbon Oxford

### Public sector
- Cherwell District Council
- Oxford City Council
- Oxfordshire County Council Innovation Hub (iHUB)
- Oxfordshire Growth Board South Oxfordshire District Council
- Smart Oxford
- Vale of White Horse District Council
- West Oxfordshire District Council

### Oxfordshire's low carbon innovation projects
See Figure 5.4

### Oxfordshire's leading low carbon business
See Figure 5.5

## Oxfordshire's low carbon ecosystem



### Community level
- Community Action Group (CAG)
- Good Food Oxford
- Low Carbon Hub CIC
- Oxford Community First
- Oxfordshire Community & Voluntary Action
- Oxfordshire Social Enterprise Partnership

### Incubators and accelerator programmes
- Centre for Ecology and Hydrology
- Centre for Agriculture & Biosciences International
- Climate-KIC accelerator
- Culham Centre for Fusion Energy
- Energy Systems Accelerator
- Enterprising Oxford
- Harwell Energy Tec cluster
- HR Wallingford
- Oxford Bio-escalator
- Oxford Foundry
- Oxford Innovation
- Oxford University Innovation
- Rutherford Appleton Laboratory (RAL)
- Satellite Applications Catapult
- Science Technology Facilities Council (STFC)
- The Faraday Institution
- The Hill
- Wood Centre for Innovation

### Academia, higher education and skills
- Activate Learning
- Abingdon & Witney College
- Henley College
- Oxford Brookes University
  - Oxford Institute for Sustainable Development
- Oxfordshire Skills Board
- University of Oxford
  - Environmental Change Institute
  - Oxford Martin School
  - Smith School of Enterprise and Environment
  - Transport Studies Unit

### Supporting and professional services
- Eco-designers
- HVAC engineers and installers
- Insulation suppliers and installers
- Intellectual Property solicitors
- Low carbon business advisors
- R&D Tax credit advisors
- Renewable energy installers
- Sustainability consultants

## 5.2 Business, technology, and social innovation networks

Oxfordshire has a strong array of networks that connect clusters and individual organisations. They excel at bringing together like-minded people with a common goal and facilitate networking and collaboration. While their impact can be difficult to quantify, the importance of Oxfordshire's networks cannot be understated: they provide the lifeblood for our world-leading innovation ecosystem. Networks provide continuity beyond individual project lifespans, help to signpost, communicate and share learnings amongst a wide range of stakeholders and the broader public. This is particularly true for innovation in environment and sustainability, which has been driven in Oxfordshire by strong networks such as the Community Action Group (CAG) network, Low Carbon Hub CIC, Low Carbon Oxford,[70] Good Food Oxford, and Oxfordshire Greentech.

Low Carbon Hub is a social enterprise with a long history of establishing and running innovative community energy projects and cross-sector collaborations (see case study in this chapter). It was a founding member of Low Carbon Oxford and commissioned the 2014 Low Carbon Economy report. Low Carbon Hub further incubated Good Food Oxford to its launch in 2013, had a lead role in developing the bid for Project LEO, and is the largest investor in the project after SSEN. Low Carbon Hub CIC has a network of 35 community group shareholders, which represents nearly half of the county's low-carbon groups. It also developed the OxFutures I partnership project funded by Intelligent Energy Europe 2012–2016 and supported by the County and City councils, and developed the bid and led the consortium for the OxFutures II ERDF-funded project which led to the formation of Oxfordshire Greentech (see case study in Chapter 7).

Working closely with academic institutions, the public sector and community groups, Low Carbon Hub is at the heart of Oxfordshire's sustainability ecosystem.

Oxfordshire Greentech was launched by Bioregional, Cherwell District Council, and Cambridge Cleantech in 2019, aiming to facilitate the transition to a low-carbon economy by putting on workshops, networking and expert-led knowledge-transfer events and providing funding opportunities. Members, which include businesses in the low carbon sector, as well as those adapting their business models in line with net-zero, benefit from the opportunity to showcase their sustainability credentials for a wide audience. Oxfordshire Greentech have recently partnered with OxLEP to launch a new innovation competition called Energy Pathfinders 2050, aiming to find and showcase Oxfordshire's top 10 most innovative energy projects at a regional, national, and even international level. This will help draw investment for innovative projects into the region and give businesses and projects much needed funding to develop and scale-up.

Several business and technology parks also have their own onsite networks and support systems, such as Harwell Green Club based on the Harwell Campus, which is a forum for people on and off campus who share an interest in a zero-carbon future that hosts speakers with specialist knowledge of an area of interest for the group.

70 This has now been superseded by the Zero Carbon Oxford Partnership.

The strength of Oxfordshire's community action scene is also a crucial component of the county's innovation ecosystem. The Community Action Group (CAG) network comprises over 80 groups from around the county, covering issues such as waste, transport, food, energy, biodiversity and social justice. CAG was established and has been funded by Oxfordshire County Council since 2001, supporting their members with capacity-building, fundraising, training and development. In 2018–2019 the network prevented 82 tonnes of waste from going to landfill, saved 62,323 kWh of energy, and avoided 191 $tCO_2$.[71] The CAG groups reach 80,000 people and contribute 50,000 volunteer hours to the county per year. It is the largest network of its kind in the UK.

In 2021, Oxford City Council launched the Zero Carbon Oxford Partnership. Building on experiences of running Low Carbon Oxford, 21 leaders from the city's universities, institutions, and large businesses have been invited to sign the Zero Carbon Oxford Charter marking their support for achieving net-zero carbon emissions as a city by 2040. With emphasis on collaborative working, the City Council intend to set up 'sprint groups' focused on transport; energy; creating consortium bids for funding; joint purchasing and procurement; and green-lobbying.

Collaboration underpins the success of Oxfordshire's innovation ecosystem – and this is notable from the reach and achievements of Oxfordshire's networks. Besides these, Oxfordshire boasts a strong informal network of experts, business leaders and community leaders which help to keep sustainability high up on the local agenda and raise awareness amongst the public. Evidence for this can be seen in the membership of the steering group for the Oxfordshire Energy Strategy,[20] and the large numbers of attendees at workshops and events such as One Planet Living Oxfordshire's visioning workshop,[72] and the Oxford Energy Network's Colloquia series.

Photo: Bridge Street Community Garden, Banbury

71 CAG Oxfordshire (2019) Annual Report.

72 One Planet Living Oxfordshire our shared vision workshop.

## Case Study: Low Carbon Hub

Spun out of climate change action groups in West Oxford in 2011, the Low Carbon Hub now has a portfolio of 47 renewable energy projects.

Their aim is to prove that we can meet our energy needs in a way that's good for people and good for the planet. They develop community-owned renewable energy installations across Oxfordshire that not only produce clean energy but also generate income to reinvest in further carbon cutting projects. They support energy efficiency projects and provide funding and support to other community energy schemes.

**Powering Up** – Shifting to renewable energy generation: Managing 47 renewable energy projects generating 4.5 GWh of electricity per year, enough to save 1,343 tonnes of $CO_2$. They also support community energy projects offering expertise and grant funding.

**Powering Down** – The Low Carbon Hub want to create incentives making it easy and cost-effective to improve energy efficiency. This includes increasing retrofits for homes and businesses, and they launched Cosy Homes Oxfordshire and Energy Solutions Oxfordshire to help accelerate energy efficiency in these sectors.

**Innovation** – A partner on Project LEO working closely with the Distribution Network Operator, researchers and digital platform developers, Low Carbon Hub are leading the charge for developing a smart local energy system, empowering communities and delivering energy justice.

£7.3 million has been invested in Low Carbon Hub, from more than 1,300 investors.

Photo: Adriano Figueiredo

## 5.3 Living Labs

### 5.3.1 The concept of living labs

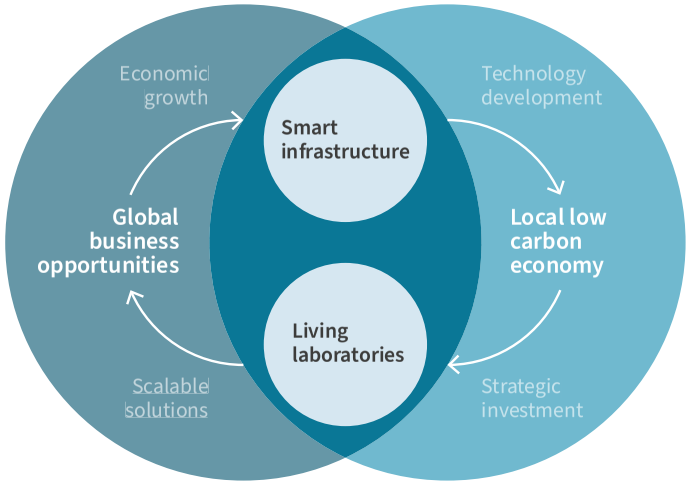
The 2014 Low Carbon Economy report proposed Living Labs as a model for overcoming barriers to innovation and growth, based on collaborative working among and between sectors, and operating at several scales. Living Labs are place-based testbeds, smart living pilots, using emerging technologies to provide proof of concept in order to scale up and scale up and roll out in other locations.[73] In the context of the low-carbon economy, Living Labs are crucial innovation models, going beyond business networks and technology clusters to facilitate large-scale place-based experimentation to trial the systems, partnerships and technologies needed to enable the transition to a low-carbon economy.[74] The European Network of Living Labs (ENoLL) brings together 150+ active Living Labs members worldwide, seeking to create an innovation friendly environment in Europe. Living Oxford (Living Oxfordshire CIC), an umbrella organisation and network for Living Lab activities, projects, and places within Oxfordshire, applied for membership in November 2020.

Since 2014, many other projects in Oxfordshire have built on this Living Lab approach and have progressed, providing useful learning and enabling better understanding of the county's innovation ecosystem. Especially important are the monitoring and evaluation aspects which lead to honest reflections and learning about what does and does not work, as well as engagement with various stakeholders, and avoiding sole reliance on technological solutions.

73 Voytenko, Y., McCormick, K., Evans, J., Schliwa, G., 2015. Exploring urban living labs for sustainability and low carbon cities in Europe. *Journal of Cleaner Production*.

74 Bulkeley, H., Marvin, S., Palgan, Y.V., McCormick, K., Breitfuss-Loidl, M., Mai, L., von Wirth, T., Frantzeskaki, N., 2018. Urban living laboratories: Conducting the experimental city? European Urban and Regional Studies.

**Figure 5.3:** Living laboratories as a driver of Oxfordshire's economy




Though there are varying definitions of what constitutes a Living Lab,[50] Voytenkoa et al (2016) outline 5 criteria for identifying Living Labs in accordance with the above description:

- **Geographically-embedded** – Living Labs are situated in a geographical area. They may use virtual resources, but they are predominantly focused on real-world application. The geographical area is normally clearly defined and has a manageable scale.
- **Experimentation and learning** – Living Labs test new technologies, ideas, practices, business models and policies in highly visible ways, which can prompt radical social and technical transformation.
- **Participation and user involvement** – Living Labs use participation and co-design with stakeholders, including end-users, accommodating the background and interests of different stakeholder groups. They represent research and innovation processes within a public-private-people partnership.
- **Leadership and ownership** – For Living Labs, skilful leadership is required to find a balance between steering and controlling. Those leading the Living Lab must cultivate openness to new ideas and different stakeholders, as well as having determination to see an idea through to its conclusion.
- **Evaluation and feedback** – Living Labs not only measure actions and outcomes, but use the lessons learned to refine, improve, and design the next round of actions. Openness and honesty about disappointing results is part of the process.49

Due to their scale and aims, Living Labs require different forms of innovation – not merely those that are technological – to excel. What makes them appropriate for the scale of change needed is that they use both:

- '**Science and technology-based innovation**' (STI),[75] which tends to exploit specific knowledge bases (mainly technical and analytical) and is the realm of much research & development (R&D) funding. STI is typically most relevant for earlier technology readiness levels.[76]
- '**Doing, using, interacting**' (DUI) innovation, which makes intensive use of experience and interaction through learning-by-doing, by-using and by-interacting. The knowledge and value created here comes from the combination of people and resources and can usefully be applied for later technology readiness levels.

The importance of technology deployment, real-world testing, and engagement – beyond just research and development – make for an effective collaboration.

75 Parrilli M. D. & Radicic D. (2021), STI and DUI innovation modes in micro-, small-, medium- and large-sized firms: distinctive patterns across Europe and the U.S. European Planning Studies.

76 European Commission (2014), Horizon 2020: Work Programme 2014–2015.

### 5.3.2 A strategy for Living Labs

Clean growth is a core component of Oxfordshire's Local Industrial Strategy, and OxLEP highlights the potential to build on the Living Labs concept by developing a framework of underpinning principles. These are intended to support the roll out of programmes, data sharing across potential locations and ethical requirements for dealing with real households and businesses.

Supporting these principles is Living Oxford,[77] set up to be an umbrella organisation and network for Living Lab activities, projects, and places within Oxfordshire to enable sharing of experience and learnings, from innovation at a community level across all sectors. Its founding members represent business, research, and public sectors: Oxfordshire County Council, Oxford City Council, West Oxfordshire District Council, SMART Oxford, University of Oxford, Oxford Brookes University, RACE (UKAEA), Harwell Science & Technology, The Hill, MobOx, 42, The Zeta Group, Ocado, EDF and Siemens. Using a Living Lab approach, the consortium leverages and connects people, places, organisations, and projects to deliver better solutions to real world challenges. As an example, it will be delivering The Future of Hydrogen Roadmap for the County Council, a white paper for transformation of energy across local authority-related operations and services to achieve the net-zero targets from the viewpoint of a hydrogen economy.

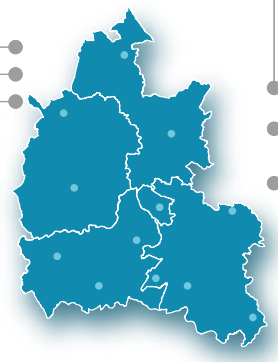
### 5.3.3 Low Carbon innovation projects

Oxfordshire has an extensive array of low carbon innovation projects, focused on autonomous and low-carbon mobility, renewable energy, and new housing developments. Many of these projects meet the definition of Living Labs described above, involving private, public, and academic institutions, and featuring innovative technology usage in real-world situations with user testing, monitoring and evaluation. Figure 5.4 provides a snapshot of some of the major low carbon innovation projects in Oxfordshire.

The unique value of these projects is their whole-systems approach to low carbon innovation. Not only do they involve developing, trialling and deploying technological solutions, but they combine social and business-model innovation too. This is seen in Park and Charge's aim to connect communities without access to home charging to EV charging facilities with dynamic billing rates; and Energy Superhub Oxford's use of demand side flexibility to deliver renewable heating at a lower cost to Oxford residents. The inclusion of diverse individuals and communities is essential for ensuring a just transition, and several of the projects underway in Oxfordshire are addressing issues of equity and fairness.

77 The trading name for Living Oxfordshire CIC.

**Figure 5.4:** Oxfordshire's major low carbon innovation projects



## Oxfordshire's major low carbon innovation projects

### V2go
- Arrival
- CleanCar.io
- EDF Energy
- EO Charging
- Oxfordshire County Council
- Oxford University
- Upside Energy

### OxFutures
- Bioregional
- Cherwell District Council
- Low Carbon Hub
- Oxford City Council
- Oxford Brookes University
- University of Oxford

### Elmsbrook Bicester
- A2Dominion
- Arcadis
- Barton Wilmore
- Crest Nicholson
- Cherwell District Council
- Farrells
- PRP

### Go Ultra Low Oxford
- Centre on Innovation and Energy Demand
- Co-Wheels
- ecomotion
- ENSTO
- eVolt
- Low Carbon Oxford
- Oxford City Council
- Oxfordshire County Council
- Ubitricity
- University of Oxford
- Zeta

### Energy Solutions Oxfordshire
- Low Carbon Hub
- Environmental Information Exchange (Oxford Brookes)

### Endeavour
- BSI
- DG Cities
- Immense
- Oxbotica
- Oxfordshire County Council
- TRL

### Omnicav
- Admiral
- Aimsun
- Arcadis
- Arrival
- Latent Logic
- Ordnance Survey
- Oxfordshire County Council
- UK Atomic Energy Authority
- WMG
- XPI Simulation

### Cosy Homes Oxfordshire
- Low Carbon Hub
- National Energy Foundation
- RetrofitWorks

### Energy Superhub Oxford
- Habitat Energy
- Invinity
- Kensa Contracting
- Oxford City Council
- Pivot Power
- University of Oxford

### Green Ammonia Demonstrator
- Cardiff University
- Oxford University
- Rutherford Appleton Laboratories
- Siemens
- STFC

### Connected Autonomous Vehicles
- Air.Car
- DRIVEN
- MaaS:CAV
- MCTEE (Millbrook-Culham Test and Evaluation Environment) project
- MULTICAV
- PAVE (People in Autonomous Vehicles in Urban Environments)

### Park & Charge Oxfordshire
- Oxfordshire County Council
- SSE
- University of Oxford
- [ui!]uk
- Zeta Specialist Lighting Ltd

Hosted by:
- Cherwell District Council
- West Oxfordshire District Council
- South Oxfordshire District Council

### Local Energy Oxfordshire
- EDF Energy
- Low Carbon Hub
- Nuuve
- Origami
- Oxford Brookes
- Oxfordshire County Council
- Piclo
- SSEN
- University of Oxford

### Garden Village Oxfordshire
- Homes England
- Grosvenor
- Oxfordshire County Council
- West Oxfordshire District Council

## 5.4 Showcasing private sector innovation

Oxfordshire has a strong and innovative private sector, developing products and services aiding Oxfordshire – and the world – to transition to a low-carbon economy. Building on our 2014 report on the low-carbon economy, Professor Douglas Crawford-Brown estimated there were at least 1,200 businesses in Oxfordshire's Low Carbon and Environmental Goods and Services (LCEGS) sector.[78] Growing at a faster rate than other sectors, he estimated an average 4.5% LCEGS growth per year between 2015 to 2018. In this report we do not attempt to update these figures, as quantifying the LCEG sector is becoming increasingly difficult,[79] and our focus is now on transitioning the whole economy to zero carbon activity. Nonetheless, this section highlights those green businesses and initiatives driving clean growth in the county. With so much activity and new companies emerging each month, this is a rapidly evolving landscape. For an up-to-date list of low carbon businesses in Oxfordshire, refer to Greentech's membership[80] and Advanced Oxford's low carbon and environment business directory.[81]

78 Crawford-Brown (2018), Materials for Oxfordshire Greentech.

79 Bishop, P., Brand, S., 2013. Measuring the low carbon economy at the local level: A hybrid approach. Local Economy 28, 416–428.

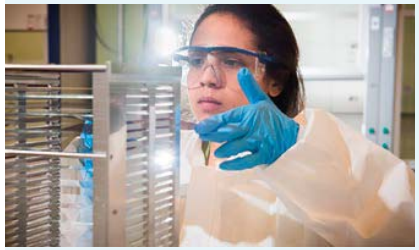
80 Oxfordshire Greentech, current membership, January 2021.

81 Advanced Oxford Low Carbon and Environment Business Directory.

Photo: Brendan Doody

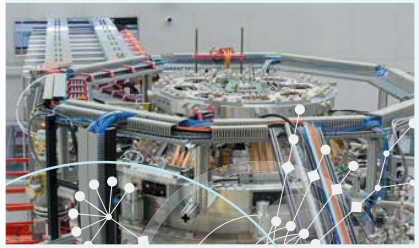
## Cutting edge technologies with global impact potential

Oxfordshire is home to several businesses developing cutting-edge technologies with potential for exporting around the world to accelerate the transition to zero carbon. These include:



OXFORD PV™
The Perovskite Company

**Oxford PV** – The Perovskite CompanyTM, is a world leader in the field of perovskite solar cells. Their solar cell design extends the capabilities of current silicon cells which convert around 20 to 25% of light into energy, by adding an additional layer that absorbs photons from a wider portion of the light spectrum. Oxford PV have increased this efficiency to over 29% already, with further potential in the coming years. The Oxford University spin-out are in the process of scaling up production and are expected to be the first company to sell the next generation solar cells to the public from 2022.



tokamak energy

**Tokamak Energy** grew out of Culham Laboratory, the world's leading centre for magnetic fusion energy research, with aims to advance the development of energy production by the process of fusion, through using devices that combine plasma in a magnetic field along with superconductors. They are now valued at £208m, and in January 2020 raised £67m from new and existing investors to fund the next phase of its strategy to produce grid connected fusion power by 2030

YASA

**Yasa Motors**, a spin out company from Oxford University are the world's leading manufacturers of axial-flux electric motors and controllers for hybrid and pure electric vehicles. In 2019 they secured £18m from Oxford Sciences Innovation and other VC investors for their next stage of rapid growth. This followed YASA's announcement in mid-2019 that a luxury hybrid electric car now in series production is powered by a custom YASA motor.

## Social enterprises leading the just transition

The zero-carbon transition cannot be achieved purely through technological innovation, and there is a need for alternative business models to reduce waste and deliver social value.

Oxford-based social enterprise **Waste2Taste** is addressing the fourfold problem of food waste, unsustainable food choices, food poverty, and lack of education in cookery and nutrition, using surplus food from the Oxford Food Bank, Bucksum Farm and elsewhere in their vegetarian/vegan catering service and café. They provide mentoring and training opportunities as well as Cooking for Health and Wellbeing Workshops for the homeless, vulnerably housed, and families experiencing poverty.

**Raw Workshop** create furniture from used/recycled wood and 75% of their employees come from challenging backgrounds (e.g. mental health, addiction, homelessness, criminality). Raw Workshop have provided 25,000 hours of social impact, have reused 1,500 tonnes of wood, and saved 200,000 kgs of carbon. In 2020, as Oxford City Council decided to introduce temporarily pedestrianised zones to support outdoor eating as part of the COVID-19 recovery, Raw Workshop provided the wooden planters shutting off roadspace to traffic.

## Case Study: Eco Business Centre, Elmsbrook

**Partners: Cherwell District Council, Architype, Kier, A2Dominion and Town Square Spaces.**

The Eco Business Centre is the first workspace in the UK to achieve the highest known building standard: Passivhaus Plus.

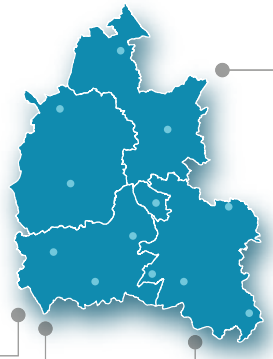
**Building Materials** include a concrete frame and timber panels, insulated with cellulose fibre insulation. Heat loss is minimised by having a double-door lobby, and external vertical timber fins create solar shading to reduce heat gains during summer.

**Natural light and passive thermal regulation**: The 3-storey design is fit-out with continuous insulation to minimise thermal bridges. A top-lit atrium with triple glazing reduces electricity use for lighting and provides thermal energy for passive heating.

**Energy Generation**: Solar Panels on the roof generate renewable electricity (almost as much as it consumes) and the heating source is the eco-village's district heating system.

**Figure 5.5:** Oxfordshire's leading low carbon businesses (not exhaustive)

## Oxfordshire's low carbon ecosystem



### Manufacturers and service providers

- 2Degrees
- 3Keel
- Achilles
- Aether
- Anthesis
- Bodle
- Climate Care
- Cryptocycle
- Earthwatch Institute
- Earthworm
- Ecoveritas
- Elementa Consulting
- Ella's Kitchen
- Ethex
- Fusion Associates
- Green TV
- Greenteck Global
- Mainer
- Oxford Advanced Surfaces Ltd
- Oxford Product Design
- OxWash
- QSA Partners
- Seacourt
- The Oxford Artisan Distillery
- WRAP

### Natural environment

- Agricompas
- Agspace
- Aston Organics
- Blenheim Estate
- Bucks, Berks, Oxon Wildlife Trust
- Centre for Ecology and Hydrology
- Cultivate
- Deep Planet AI
- Earth Trust
- East Hendred Farm
- FarmED
- Sandy Lane Farm
- Sylva Foundation
- Tolhurst Organics
- Trust for Oxfordshire's Environment

### Social impact

- Aspire
- Bicester Green
- Climate Outreach
- Common Ground
- Legacy Events
- Low Carbon Hub
- Makespace
- Oxford Wood Recycling
- RAW Workshop
- Restore
- SESI Refill
- Tap Social
- The Old Fire Station
- Turl Street Kitchen
- Waste2Taste
- Yellow Submarine

### Energy transition

- Adaptix
- Aurora Energy
- Brill Power
- CCM Technologies
- Darke & Taylor
- Ecosync
- Energy Pro
- Enistic Energy Management Systems
- Exeo Energy
- First Light Fusion
- Habitat Energy
- Halliday Hydro
- Joju Solar
- Low Carbon Hub
- Mixergy
- ODQA Renewable Energy Technology
- Oxford PV
- Oxford Solar PV
- Oxford Sustainable Fuels
- Oxis Energy
- Pivot Power
- Poyry
- Qdot
- SunReign
- The Zeta Group
- Tokamak Energy
- Velocys
- Westmill Solar
- ZapGo

### Transport and mobility

- Arrival
- BMW Mini
- Broken Spoke
- Cycleland
- EAV Solutions
- Electrogenic
- EV Car shop
- Five AI
- Intellicharge
- MobOx
- Nexeon
- OxBotica
- Oxford Bus Company
- Pedal & Post
- ProDrive
- Saietta
- Street Drone
- Williams F1 Advanced Engineering
- YASA Motors

### Built environment

- Beard Construction
- Bioregional
- Cosy Homes Oxfordshire
- Duvas Technologies
- Energy Services Oxfordshire
- Envirosash
- FAB-HAB Project
- Green Axis
- Green Unit
- Greencore Construction
- Jessop & Cook
- LCMB Ltd
- Limetec
- Lucy Group
- Rationel Windows
- Ridge & Partners
- Sow Space
- Stewart Milne Timber Systems
- Transition by Design

## 5.5 What is next for Oxfordshire?

Previous chapters have explained that in the coming decades Oxfordshire will undergo significant growth in housing, population, and employment. The low-carbon sector is thriving and is well positioned to drive job and wealth creation, while lessening negative impacts on the climate and environment. While Oxford City is at the geographical heart of the innovation ecosystem, low carbon businesses and innovation are proliferating throughout the county, in the existing science hubs in the south, new proposed science parks in the west, and along the Oxford-Cambridge Arc. The Local Industrial Strategy highlights opportunities in Bicester, for instance, proposing an Eco Zone and Hub which builds on the success of the Eco Business Centre and takes advantage of new infrastructure such as East-West Rail and housing developments.

As this chapter has demonstrated, Oxfordshire is at the forefront of low-carbon innovation, pioneering technologies and business models with global rollout potential. Its unique strengths in energy and transport innovation are underpinned not just by its world-class institutions and skilled workforce, but by the thriving networks which drive collaboration and knowledge exchange, maximising the benefit of investment and building momentum for a zero-carbon future. Within this low-carbon innovation ecosystem, low-carbon business leaders are multiplying and finding increasing demand for their products and services. The challenge in the coming decades is for all of Oxfordshire's economy to transition to low, and ultimately zero carbon activity. As Oxfordshire aims to become one of the world's top three innovation ecosystems, the low carbon sector has a crucial role to play.

### Case Study: OxWash

**OxWash uses electric cargo bikes for their customer laundry collection and delivery service, removing transport related emissions from their operations, with savings of 6,700 kg$CO_2$ per e-cargo bike/year. The laundry process used by OxWash firstly involves microfibre filtration which captures over 95% of fibres that are shed from clothes during washing, which prevents plastic pollution of water.**

**Water use is substantially reduced through the reclamation of water used in previous rinse cycled for subsequent washes, leading to a 60% and 70% saving in water consumption compared to conventional commercial and domestic washing machines respectively. There is an average water saving of 32 litres per 8kg wash.**

# 6 Transport

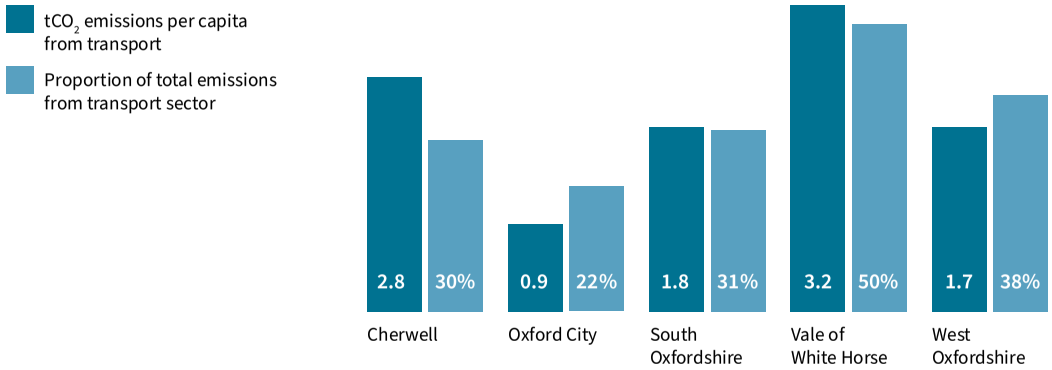
Chapter author: Hannah Budnitz

Photo: Viktor Keri on Unsplash

## 6.1 Introduction & context

The transport sector is responsible for a large and growing proportion of carbon emissions in the UK and Oxfordshire as other sectors, such as energy and industry, become cleaner. The share of carbon emissions from all road and rail transport increased from 38% to 46% between 2014 and 2018, mirroring the trend in the South East of England.

**Figure 6.1: 2018 transport carbon emissions by Oxfordshire Districts, excluding motorway traffic**




Oxfordshire, like the UK as a whole, has struggled to reduce emissions from transport, despite successes such as accelerated uptake of electric vehicles in the county and investment in cycling in Oxford City. One factor limiting progress on reducing transport emissions is that new housing has been concentrated outside Oxford City, where transport emissions per capita are higher than the national average, even once motorways are excluded. Whilst some of these extra emissions may be attributed to through-traffic on the strategic A-roads, particularly in Cherwell and the Vale, new housing developments in these areas are also more likely to be less dense and more car dependent than new housing in Oxford City.

This is evidenced by the Royal Town Planning Institute's research on the location of new housing development in Oxfordshire between 2012–2015, and 2015–2017.[82] Although the proportion of planning permission applications granted within built up areas increased from 19% to 77% between the two periods, the proportion within 10 km of an employment cluster decreased from 64% to 38%, driving up the need for longer distance commuting, which may not be possible by bus or bicycle. Less than 10% of permissions granted were located within 2 km of an existing railway station in the first period and less than 20% in the second period, meaning that rail is also not an option for many of those living in new housing developments. The tendency towards car-dependent development may be a result of the national priority to deliver large amounts of viable, new housing, even if at the expense of whether the location of that new housing would enable its future residents to travel sustainably to work and other destinations.

The relevance of planning and local place-making to reducing transport emissions has gained greater attention in the last year, as the global pandemic has forced residents to access essential goods and services close to home. Interactions between urban form and travel behaviour are complex, and assumptions that population and housing growth will lead to traffic growth must be challenged. Drastic emissions reductions cannot be achieved through a transition to electric vehicles alone, as even the most optimistic pathways towards adoption would still require significant demand reduction to meet emissions targets.[83] The key components of pathways to decarbonise transport are often described in terms of 'Avoid, Shift, Improve'. Switching to electric is an example of 'Improve', but it does nothing to reduce congestion, which requires measures that 'Avoid' travel. Nor does it increase footfall on local high streets, as a 'Shift' to local, active travel might encourage.

82 RTPI (2016), Location of New Development.

83 CREDS (2020), Decarbonising Transport: Getting carbon ambition right.

Therefore, Oxfordshire County Council's transport strategy and plans, which are currently being updated and refreshed, recognise the importance of better public transport and active travel connections and infrastructure, controlling and charging for parking, and supporting digital connectivity that reduces the need to travel, as well as encouraging the uptake of low and zero emissions vehicles.[84] Integrated policy measures and bold action on all these fronts will be required to reach zero carbon emissions from transport and achieve the vision of sustainable, resilient, healthy communities and a world-leading, innovative economy.[85]

## 6.2 Where are we now?

Oxfordshire County Council, its Districts, the Universities, and the private sector in Oxfordshire all have strong track records in promoting and attracting investment in sustainable and low carbon transport and innovation. However, this investment and innovation has not thus far resulted in falling carbon emissions from the transport sector within the County, perhaps because implementation has rarely been at a large enough scale to counteract population and traffic growth. Whilst some emissions will be outside the County's control, such as through-traffic on the trunk road network, many public and private sector stakeholders in the county recognise that a step change in ambition in tackling local emissions is required.

### 6.2.1 Summary statistics

Oxfordshire County Council published its 4th Local Transport Plan in 2016, but they are now developing their 5th Local Transport and Connectivity Plan (LTCP), partially in response to the declaration of a climate emergency and the lack of progress in reducing road traffic emissions. As they began updating their strategy in 2019 by reviewing the situation in Oxford City, they reported that daily traffic flows across the ring road had increased by 5% since 2012, with an average of 45,000 vehicles on the City's roads every morning rush hour.[86] Bus journeys appear to have peaked in Oxfordshire in 2013/14 at 43.2m, with 40.8m recorded in 2019/20, although Oxfordshire residents take more bus journeys per capita than the average for residents of the South East at 59 versus 36.[87] Railway stations in Oxfordshire saw increases in passengers entering and exiting stations in the county year on year, with 21.7m in 2019/20,[88] partially due to the new train line that opened between North Oxford and Bicester. However, there is great uncertainty over the impact of the COVID-19 on rail travel longer term (see section 6.3).

84 Oxfordshire County Council (2019), Connecting Oxfordshire.

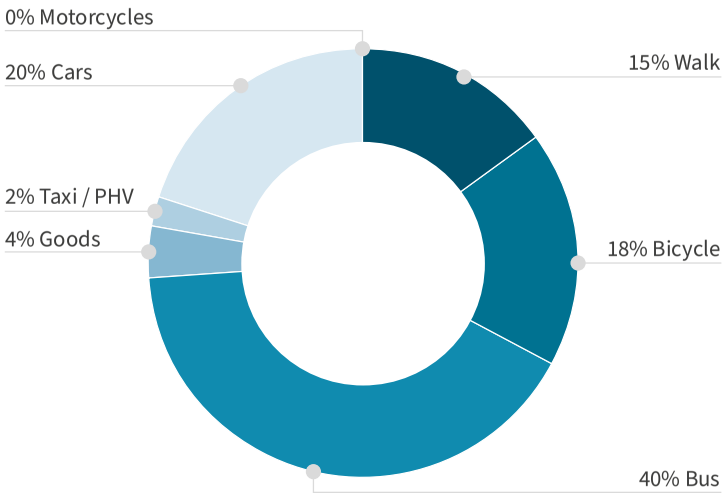
85 Oxfordshire County Council (2020), LTCP Vision Document.

86 Oxfordshire County Council (2019), Connecting Oxfordshire.

87 DfT (2020), Local bus passenger journeys.

88 Office of Rail and Road (2020), Estimates of station usage.

**Figure 6.2: Mode split of journey between 07:30 and 09:30 into Oxford City Centre**




Cycling across the inner and outer cordons of Oxford City increased by 18% and 15% respectively between 2007/09 and 2016/18, with steeper increases since 2012/14 across the inner cordon.[89] However, whilst cycling is growing in popularity in the City, this trend is not occurring in other towns in Oxfordshire. Whereas almost four thousand people cycle into Oxford city centre in the morning peak, it is estimated that there are no more than three thousand trips per day by bicycle throughout Bicester.[90] And whilst there are an estimated 18,000 pedestrian trips per day in Bicester, this compares to almost 24 thousand pedestrian trips into Oxford's city centre each day. Bicester and the other market towns in Oxfordshire do have the potential to support more active travel, but they are starting from a much lower baseline than Oxford City in terms of infrastructure as well as trips.

Surveys also suggest that 35% of pedestrian trips in Oxford City are walking for a purpose other than leisure, compared to only 15% of pedestrian trips in other Oxfordshire districts. Thus, whilst the modal split from the 2019 inner cordon count shown in Figure 6.2 is encouraging, Oxford City is an outlier. This is not surprising, and the County Council recognises that rural areas may need a different approach. In any case, further progress will be needed even in Oxford City to reach zero by 2050, and reducing carbon emissions from transport in the rest of Oxfordshire, including from travel between towns throughout the outlying districts and Oxford City, will be much more challenging.

89 Oxfordshire County Council (2020), Oxford LCWIP v192001. Approved by Cabinet 190317

90 Oxfordshire County Council (2020), Bicester LCWIP Draft v070920.

### 6.2.2 Transport and connectivity Investment and Policy

Although carbon emissions from the transport sector have been growing proportionately, there has been substantial policy support and investment in sustainable transport and connectivity in Oxfordshire in the last six years. Concerns have been mounting about dangerous levels of air pollution, and Oxford City introduced the UK's third Low Emission Zone, following London and Norwich. This was aimed at buses, so when bus operators upgraded their fleets, it had an immediate impact on air pollution: in 2017–2018, NO2 emissions fell by 22.7%.[91] However, Oxford City is not the only place to suffer from local air pollution, with Air Quality Management Areas across Oxfordshire. For example, Hennef Way, Banbury recorded the fourth highest levels of NOx in the UK outside London. Furthermore, $CO_2$ emissions from transport only fell by 1.9% between 2008 and 2018, and were rising between 2014 and 2017, despite the target of a 35% reduction between 2005 and 2020 as set out in the Low Emissions Strategy.

A selection of other sustainable transport and connectivity projects completed during this period include:

- Installed superfast broadband to almost 80,000 premises since 2014.[92]
- £20k to paint three new 5 km routes for pedestrians, joggers and runners, as part of an approximately £1 million pound investment in Bicester Healthy New Town.[93]
- £1.6 million remodelling the Plain Roundabout in Oxford as part of the successful Cycle City Ambition Fund award of £4.2 million,[94] and millions more through other funds invested in cycling schemes as mentioned in chapter 3.
- £2.3 million to upgrade 115 buses with technology to reduce emissions, particularly of nitrogen dioxide, and convert five sightseeing buses to fully electric operation.[95]
- Upgrade of the rail link between Oxford and Bicester via the new Oxford Parkway station offering passenger services to London Marylebone.[96]
- Over £800,000 to trial approximately 30 fast on-street electric vehicle chargers using different technologies, installed as part of Go Ultra Low Oxford.[97]
- Private sector investment in clean, smart, and innovative automotive technology, including Arrival, which is one of the pre-eminent companies manufacturing electric light goods vehicles in the UK, and Oxbotica, who are leading complex trials of autonomous vehicles on the public highway.

91 Oxford Mail (2019), Clean Air Day: Oxford pollution progress stalls.

92 Digital Infrastructure Programme, Progress so far.

93 Cherwell District Council (2019), Bicester Healthy New Town Case Study.

94 Cycle City Ambition Programme: Interim Report, 2018.

95 Oxford City Council (2019), City Council secures further £700,000 to upgrade buses and cut air pollution.

96 Network Rail, How the East West Rail project will make travel across Britain easier.

97 Hampton, S, Schwanen, T, Doody, B. (2019). Go Ultra Low Oxford, monitoring and evaluation of Phase One, Final Report.

EAV fleet for dpd.

## Case Study: Automotive innovation

- First local authority in the UK to have a team dedicated to CAV
- YASA technology powers Europe's largest zero-emissions aircraft
- Modular, zero-emissions vehicles assembled by robots alone

Building on its well-established automotive sector with the BMW Mini plant, firms in Oxfordshire are at the cutting edge of innovation in low-carbon mobility.

ARRIVAL

Arrival is revolutionising the electromotive industry, designing and manufacturing vehicles for commercial and public transport use. Their 'Microfactories' are designed so that modular zero-emissions vehicles can be assembled by robots alone, with all materials, components, and software developed in-house. Arrival's proprietary composite materials are 50% lighter than steel, while being durable and resistant to damage.

eav

EAV Transport Solutions are a frontrunner in last-mile transport solutions, having created a pedal and battery-powered hybrid cargo vehicle that they say is 'designed down from a van, not up from a bike.' EAV use natural flax fibre composites so that bodywork is bio-recyclable, and manufacture or locally source materials where possible, with the bodywork and chassis made on site, thereby reducing carbon footprint.

oxbotica

Oxfordshire is also pioneering autonomous vehicle technology, a concept that could lead to improved road safety, greater independence (especially for elderly people and those with disabilities), and reduced congestion and emissions. Tests of six autonomous vehicles in Oxford have now begun as part of a government-backed research scheme named 'Project Endeavour'. Led by Oxbotica, this initiative aims to demonstrate 'level four' vehicle autonomy, which means the car can drive itself without the need for a driver. Vital pioneering schemes such as DRIVEN, MultiCAV, CAVL4R and OmniCAV are also underway and the county council is the first local authority in the UK to have its own team dedicated to Connected Autonomous Vehicles (CAV)

YASA

YASA's revolutionary compact, lightweight and powerful electric motors and controllers enable vehicle hybridization and electrification – especially when there is limited powertrain space. The YASA (Yokeless And Segmented Armature) motor topology also significantly reduces manufacturing complexity, making the motors ideally suited to automated volume production. YASA has gone on to power Europe's largest zero-emissions aircraft, and an YASA electric motor powers Ferrari's first hybrid series production sports car, the SF90 Stradale.

Road improvements have also been progressed over the last six years, as part of new developments planned in Oxfordshire's Housing and Growth Deal and the Oxfordshire Infrastructure Strategy (OxIS) published in 2017. Some of these have included substantial elements for sustainable transport, such as the bus lane along the A40 or the pedestrian and cycle facilities at Culham, but some have been more traditional improvements to road capacity, such as the Lodge Hill Interchange project near Abingdon, and works at Featherbed Lane and Steventon. Road building, particularly to support new developments which may then be more car-dependent, is short-sighted when it has become clear that the transition to zero carbon vehicle technologies is insufficient to reach net-zero within the timescales set by the Paris Agreement or most local governments.[98] Local policy-makers recognise this, and, as climate policy was strengthened over the past two years, the decision was made to revisit the Infrastructure Strategy. In developing the fifth LTCP and revising OXIS, there is consensus around seeking opportunities to accelerate the decarbonisation of transport.

## 6.3 Challenges and uncertainty around future opportunities

Oxfordshire's 2017 Infrastructure Strategy is under review three years after its publication, offering policy-makers an opportunity to reconsider the challenges of accommodating population and employment growth whilst accelerating plans to reduce carbon emissions, particularly from transport. Its review is also a reminder of the challenges of divided governance structures, where funding sources, statutory responsibilities and policy priorities do not always align.

The five district-level local authorities in Oxfordshire are responsible for producing Local Plans with sites allocated for new development and land for future housing, the amount of which is set by a centralised formula, but they have little authority over transport. Meanwhile, the County Council is responsible for transport planning and local transport infrastructure, preparing and updating the LTCP. Quasi-governmental, national bodies such as Highways England and Network Rail have oversight of strategic road and railway infrastructure, and thus major infrastructure projects like new roads or railway electrification. County and District Councils are increasingly able to influence strategic transport network planning as a result of their collaboration on the Oxfordshire Growth Board, but there is a top-down approach to nationally significant infrastructure, with final decisions made by Government Ministers. Collaboration is also the primary tool available to the Districts and County on matters such as cross-border housing provision and Air Quality Management Plans, such that without consensus on an approach, the lack of stable, strategic direction from central government can undermine rather than encourage action.

Oxfordshire also lies at the western end of the area known as England's Economic Heartland (EEH), an area that has developed a strategic partnership between 11 Local Authorities from Swindon to Cambridgeshire. EEH is a Sub-national Transport Body, recognised by the Department for Transport and other public and private sector bodies responsible for delivering transport. As such, it is at the heart of not only one of the largest and growing sub-regional economies in England, but also of the debate around how transport can support growth and simultaneously decarbonise. An east to west railway line and an expressway were proposed as solutions. Phase 1 of the Western section of East West Rail – Oxford to Bicester – is already complete as described in section 6.2.2, and the next section to Bletchley is under construction.

98 CREDS (2020), Decarbonising transport: The role of land use, localisation and accessibility.

Neither the Transport Strategy published by EEH, nor their submission to government the year before on investment priorities for the Major Road Network in the area include the East West Expressway proposal.[99] One reason for the exclusion is because EEH and many of its constituent authorities are determined to reduce carbon emissions from transport and are aware of the increasing evidence that new roads or increasing the capacity of existing strategic roads will increase carbon emissions from transport. Even assuming a rapid transition to electric cars, capital road investment increases carbon emissions from three main sources, as is clearly described in a recent report evaluating *The carbon impact of the national roads programme* (Highways England's second Road Investment Strategy or RIS2):

- embodied carbon in the raw materials used to build the infrastructure;
- increased speeds as these roads can handle faster traffic flows; and
- induced traffic as longer-distance travel and more car-dependent development is encouraged by the increased road-based accessibility.[100]

The A34 between Newbury and Oxford is included in the approved RIS2 in order to explore "*opportunities to reduce congestion and improve safety*".[101]

As some of this route was also part of the East West Expressway proposal, this project suggests that new road investment in Oxfordshire is not completely off the table, although the Transport Secretary officially cancelled plans for the East West Expressway in March 2021 after the Government committed to developing a spatial framework for the sub-region that would include revised transport policy.[102]

Meanwhile, EEH have recently commissioned multi-modal connectivity studies to look at all options, including digital connectivity, to further improve networks across the sub-region. The importance of investment in digital connectivity to support those behaviours which reduce travel and carbon emissions from transport has been highlighted by the COVID-19 pandemic, which has greatly accelerated trends towards online shopping and home working, the latter of which involves online interactions. The Office for National Statistics estimated that 47% of people in employment in the UK worked solely from home in April 2020.[103] Although this fell to about 20% in September when people returned to work in their greatest numbers during the pandemic,[104] this is still much higher than the 5% who worked solely from home in 2019 or even the larger proportion who regularly worked from home multiple days per week over the last decade.[105] Working from home could become permanent for many employees, especially as so many of those who first experienced working from home during the Spring lockdown said they would be interested in continuing to do so at least some of the time.[106] Co-working spaces near home offer a hybrid solution that was also growing in popularity prior to the pandemic.

99 England's Economic Heartland (2021), Transport strategy and Major road network.

100 Sloman and Hopkinson (2020), The carbon impact of the national roads programme.

101 Highways England, A34 improvements north and south of Oxford.

102 DfT (2021), Oxford to Cambridge expressway project cancelled.

103 ONS (2020), Coronavirus and homeworking in the UK.

104 ONS (2020), Coronavirus and the latest indicators for the UK economy and society.

105 ONS (2019), Home working in the UK.

106 Kelly (2020), The work from home revolution is quickly gaining momentum.

For example, five new, dedicated facilities opened in Bicester in the past three years. Nonetheless, research indicates that working from or near home may not reduce car trips if car travel is required to access other activities and amenities.[107]

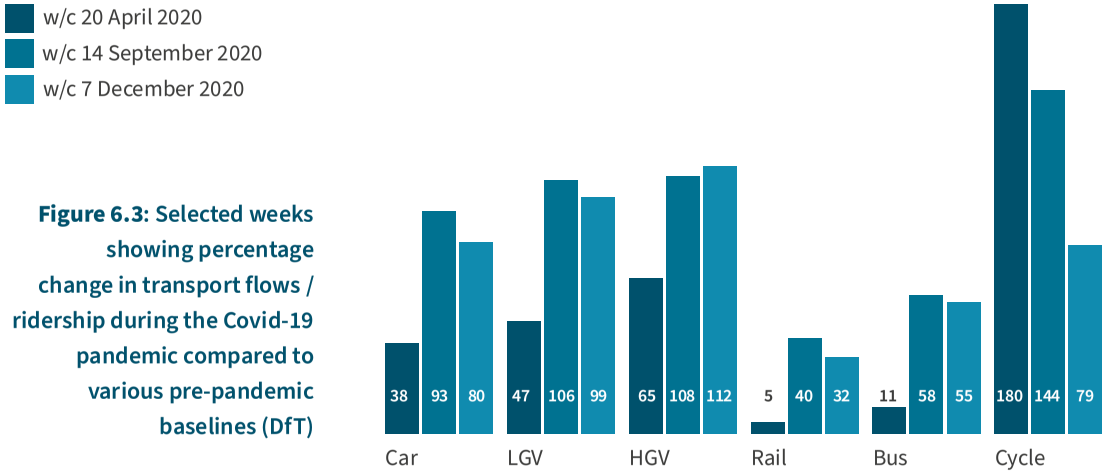



**Figure 6.3: Selected weeks showing percentage change in transport flows / ridership during the Covid-19 pandemic compared to various pre-pandemic baselines (DfT)**

Furthermore, for those who cannot work from home, the pandemic has undermined trust in public transport, which has regained only a fraction of the ridership it had in 2019, whilst car travel has rebounded much more.[108] With rail particularly affected, in part because many rail commuters have been working from home, this adds uncertainty to the strategic impact of a public transport approach for the sub-region based around the development of East West Rail and its links with existing mainline services.

Oxfordshire also reported on the first phase of its Rail Corridor Study just before the pandemic, considering options for additional capacity to and through Oxford and the potential of reinstating the Cowley branch line. Although this study is now reaching the stage where an investment programme is being developed, it comes at a time of uncertainty rather than on the back of year on year increases in rail travel, as was the case in 2019. In comparison, bus travel has maintained a stronger customer base during the pandemic than rail services, despite passenger numbers previously having been on a downward trend. In Oxfordshire, buses are particularly important for travel on main routes into Oxford City, where there has been long-term investment in a Park and Ride network and low emission intra-urban buses, complemented by high charges for parking in the city centre. Oxfordshire is also preparing a business case to finalise provisionally agreed funding from central Government to become one of two All Electric Bus Towns in the UK, which will involve Oxford City, and potentially radial routes to other towns in the county.[109]

There is also uncertainty around the future trends for active travel. Walking and cycling became more popular during the first lockdown, with cycling trips almost doubling compared to the first week of March 2020, but this increase has not been sustained during the wet weather of Autumn and Winter, as car travel increased. It is also unclear how much travel over the spring and summer was for leisure or exercise, rather than utility, although the pandemic also highlighted the importance of access to nature for well-being and mental health. Heavy and light goods vehicular traffic have also returned to above pre-pandemic levels, as the popularity of ordering goods online for home delivery has been accelerated, and non-essential shops have increased their delivery services in order to remain open whilst their shopfronts were forced to close.

107 Budnitz, H, Tranos, E, Chapman, L. (2020), A transition to working from home won't slash emissions unless we make car-free lifestyles viable. The Conversation.

108 DfT (2021), Transport use during the coronavirus (COVID-19) pandemic.

109 DfT (2021), Coventry and Oxford set to be UK's first all-electric bus cities.

The pandemic has demonstrated the scale of behaviour change that is possible, but also the uncertainty of longer-term shifts and impacts, which could either help or hinder the decarbonisation of transport. Interventions and investment are required to maintain and guide behavioural changes made during the pandemic and further transitions in connectivity and mobility, including electrification, in a way that will meet long-term policy goals. This is recognised in Oxfordshire, where the emergency reallocation of road space and other active travel measures funded during the pandemic, for example, are mostly intended to be permanent. Yet with so many uncertainties about the future and factors beyond local control, the journey to net-zero remains a challenge.

## 6.4 The journey to zero

The Transport Strategy[110] from EEH clearly sets out pathways towards decarbonising transport by 2050 or even 2040 if possible, whilst supporting the economic success of the region. They recognise that electrification of road and rail transport is only part of the solution, and that it will also be necessary:

- to build on the technological innovation the sub-region is known for to deliver more efficient and connected transport options, including shared, autonomous vehicles; and
- to reduce car trips through demand management and measures that make walking, cycling, shared and public transport the preferred options for local travel, with investment reflecting this road user hierarchy.

As part of the latter, there are proposals to invest in digital connectivity, and there is recognition that electrification and innovation must address emissions from freight transport as much as passenger transport. The emerging LTCP vision also aims to achieve 'a net-zero Oxford transport system... by reducing the need to travel, securing high quality gigabit connectivity, and by discouraging unnecessary individual private vehicle use through making active travel, public and shared transport the natural first choice'.[111] This vision fits well with the 'Avoid, Shift, Improve' framework discussed in the introduction to this chapter. The County and Districts in Oxfordshire are taking steps to set out their agenda for Shift and Improve by collaborating to formally approve documents such as the Electric Vehicle Infrastructure Strategy and the Local Cycling and Walking Infrastructure Plans, which set out policy priorities and commit to certain actions.

Avoid is more about demand management, and proposals are being progressed for a Zero Emissions Zone in Oxford City centre, with charges for all vehicles with tailpipe emissions,[112] and for a Workplace Parking Levy, traffic restrictions and bus priority in the 'Eastern Arc' of Oxford City.[113]

Other examples of committed plans to invest in infrastructure to support pathways towards decarbonising transport include:

- Almost £3million to improve and segregate cycle paths and widen pavements in Bicester and Witney, and install Low Traffic Neighbourhoods in Oxford City as part of the Department for Transport's Active Travel Emergency Fund.[114]

110 England's Economic Heartland (2021), Transport Strategy.

111 Oxfordshire County Council (2020), LTCP Vision Document.

112 Oxford City Council (2021), Zero Emissions Zone.

113 Oxfordshire County Council (2019), Connecting Oxfordshire.

114 Oxfordshire County Council (2021), Emergency Active Travel Fund, Phase 2.

- Bus priority and new park and ride services on the A40 between Eynsham and Oxford City.
- Private sector investment in micromobility schemes, including bicycles, e-bikes, e-scooters, and e-cargo bikes.[115]
- Over £5million to install fast electric vehicle charging hubs in two dozen public car parks throughout Oxfordshire in 2021 as part of the Park and Charge project funded by Innovate UK.[116]
- Continued roll out of Controlled Parking Zones to manage demand for parking throughout Oxfordshire and complement the Workplace Parking Levy.

The success of any decarbonisation pathway is dependent upon policies and regulations that are consistent with the climate emergency and net-zero declarations of the local authorities and other stakeholders in Oxfordshire, as well as active engagement with residents and businesses. For example, the consultation draft of the LTCP vision makes it clear that they recognise that different approaches may be required for more rural areas compared to the urban parts of the County, and that freight may need to be managed differently from passenger transport. Indeed, proposals for reducing emissions from freight range from alternative fuels, both electric and hydrogen, to alternative technologies, such as driverless convoys, to alternative business models, such as freight consolidation centres. Engagement will also be essential to overcome concerns around the safety of public transport and to take advantage of changes in commuting patterns to minimise operational costs on public transport.

115 Pony.

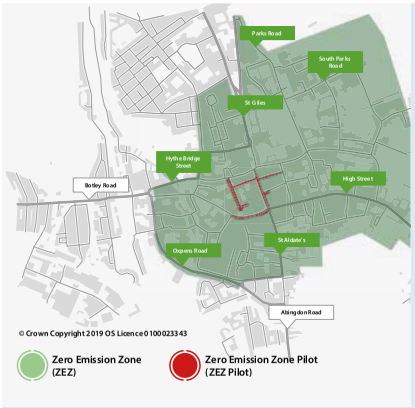
116 www.parkandchargeoxfordshire.co.uk.

However, demand for goods and travel is generated to enable people to participate in work and other activities, access amenities and services, as well as green space and nature, and interact with others. Thus, the ability to Avoid or Shift trips and mileage remains a function of land use planning, spatial strategy, and the density of housing and activity. To achieve a zero-carbon future, especially in light of the expected job, housing and population growth in Oxfordshire, planning for every new development, regeneration or change of use must aim for carbon neutrality in its transport impacts through careful location and design.[117] As discussed in Chapter 2, there has been some decoupling of growth and carbon emissions in Oxfordshire, but this has not yet resulted in falling emissions from transport.

### Ports and airports

Plans for decarbonising transport across the EEH sub-region also consider reducing emissions from travel between the sub-region and ports and airports, but do not directly include the emissions from aviation or shipping, nor how the demand from the sub-region's population for flying or for goods utilising the global supply chains might be reduced and mitigated. Emissions from these sources are often excluded from local net-zero pathways due to a lack of both data at a sub-national level, and limited local control over measures such as airport expansion. Therefore, they are also not included in our scenarios, but it is important to recognise that local people and businesses have a role in the emissions from these sub-sectors as well as from road and rail transport.

117 RTPI (2021), Net-zero Transport: the role of spatial planning and place-based solutions.




## Case Study: Zero Emissions Zone (ZEZ), Oxford

### Partners: Oxford City Council, Oxfordshire County Council

**Oxford's Zero Emissions Zone (ZEZ) is set to be the first of its kind, acting as a regulatory driver to encourage the transition towards zero emissions transport and helping the city to tackle its air pollution, congestion, and improve quality of life for residents.**

**Vehicles entering the ZEZ will need to be 100% zero emission vehicles in order to avoid charges, with all other vehicles being charged between 7am and 7pm an initial £2–£10 per day, which will increase to £4–£20 per day by August 2025. Exemptions and discounts will be given to certain road users, and the councils are providing support to residents and businesses to adapt. Traders in the Covered Market are being supported by the City Council to receive deliveries through sustainable modes, including through EV charging points, purchasing several electric vans and cargo bikes, and installing additional storage space for goods. Pedestrianisation of the city centre will increase the city's vitality and air quality.**

**The rollout of the ZEZ will initially cover 8 main roads and will be expanded to cover the rest of the city centre in Spring 2022.**

> **"2021 will be a landmark year in Oxford's journey to improve air quality and tackle the climate emergency… We know the impact that air pollution can have on people's health, and the ZEZ will help us make a difference both in Oxford and beyond." Councillor Tom Hayes, Oxford City Council**

In our scenarios we identify pathways to zero-carbon transport within Oxfordshire that all require a mixture of Avoid, Shift, and Improve, but the amount occurring in each varies depending upon whether the focus is on societal transformation, technological change or local leadership. For example, a societal transformation might expect more extensive avoidance of travel than other pathways, as the acceleration of telecommuting and online shopping and services is maintained post-pandemic. In contrast, a technological transformation would see more effort to improve the performance of road vehicles, including hydrogen fuel as well as electrification, and autonomous vehicles concentrated in the freight sector. Finally, Oxfordshire could apply its local innovative industries to encourage a shift away from private car ownership to fewer shared, electric, and even autonomous vehicles. Since all scenarios will require a minimum reduction in private car travel of around 15% through avoid and shift measures by 2050 to achieve net-zero,[118] any success in reducing car travel should also reduce the fleet of cars in the county relative to population, as is shown in the scenarios. The foundations and knowledge for the switch to less vehicle mileage per head, more efficient use of fewer vehicles, and the spread of zero-carbon technologies are all available in Oxfordshire. The next steps in setting out ambitious policy are underway, and ambitious action must follow.

118 Committee on Climate Change (2020), Sixth Carbon Budget: Sector Summary Surface Transport.

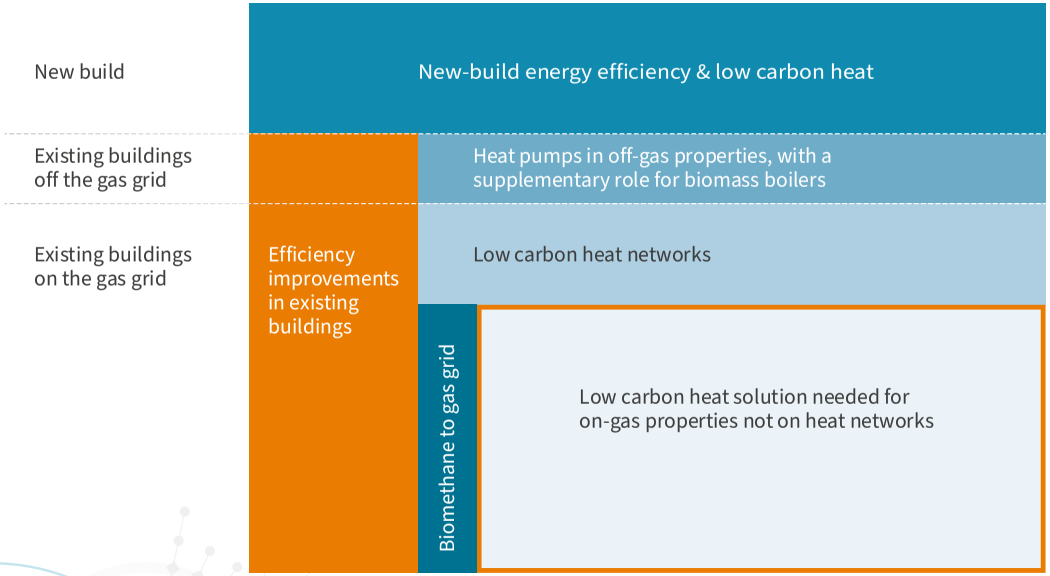
# 7 Energy efficiency and heating demand in buildings

Photo: Erik Mclean on Unsplash

## 7.1 Introduction

The decarbonisation of heat is a current 'grand challenge' in UK research and policy, reflecting the complexity of the topic and the fact there are many contingent questions and no clear right answers. The Committee on Climate Change summarised the challenge of heat decarbonisation graphically[104], highlighting several technical options that could contribute towards the overall goal, but with a large remaining unknown for heat in buildings that are currently on the gas grid (Figure 7.1).[119]

**Figure 7.1: The buildings heating challenge and some partial solutions. The size of each block is roughly proportional to the scale of emissions reduction**




119 Committee on Climate Change (2016), Next steps for UK heat policy.

The Committee on Climate Change has called for no new conventional gas boilers to be installed in buildings ahead of 2035 (phase-out dates range from 2025–2033 for different sub-sectors of the building stock).[120]

The challenge of decarbonising heat can be understood in terms of three interdependent elements: energy sources; system impacts, especially peak demand; and changes within buildings (reducing heat loss and installing new conversion technologies). These all have an impact on heat in buildings. The switch away from fossil fuels (gas, oil, LPG) will require new end-use conversion technologies within buildings, but also changes to buildings themselves to reduce heat loss and overall energy demand. There are several reasons for this. Firstly, peak demand for heat and electricity in the UK are both closely associated with residential demand. If residential heat demand is to be electrified, then the peak will increase, leading to greater cost and complexity in providing secure energy supply. Energy efficiency can significantly reduce the demand for heat, making the peak lower and the whole system more resilient. Secondly, the vast majority of residential heating systems will need different end-use technologies and changes in household practices around heating. Old, inefficient homes will in many cases need to be upgraded to be compatible with heat pumps by reducing heat loss and increasing the size of radiators. Thirdly, in addition to all the technical reasons, energy efficiency of homes has an important role to play in improving health and well-being (especially for the vulnerable and fuel poor). Finally, capital investment in energy efficiency can reduce costs – not just running costs for consumers, but also avoided infrastructure costs elsewhere in the energy system as a whole.

120 Committee on Climate Change (2020), The Sixth Carbon Budget: the UK's path to net-zero.

Compared with housing, non-residential buildings are very varied in their functions, size and energy consumption patterns. Investments are needed in technology in non-residential buildings, and changes are also needed in building management and operation. Capital investments and management are both allied to decision-making in organisations, so it makes sense to focus on decision-making processes as the means of achieving changes in the non-residential sector that are in line with the zero-carbon transition.

Different approaches are needed for larger and smaller organisations, reflecting the relative formality of management structures and the available resources for decision-making. In all cases, decisions that align with net-zero carbon need to also reflect the strategic priorities of the firms themselves, which are typically nothing to do with energy or emissions. Expert and skilful advice services are needed to accompany organisations on the journey to zero-carbon, a process of engagement that can take several years. Finance will need to be part of the support package, but funding on its own is insufficient.

Achieving zero-carbon heating in the built environment will require coordination of policy-making and market transformation on a scale that has not yet been attempted.

A strong focus of recent debates has been on increased use of electricity or hydrogen (presumed to come from renewable sources) to replace the direct burning of fossil fuels (mostly gas, but also liquid and solid fuels).

There are many synergies and difficult trade-offs between the different blocks in Figure 7.1, so it makes sense to think of the heating challenge as a complex system in its own right. This can be shown by two brief examples. Firstly, the successful installation of heat pumps in existing homes will in many cases require upgrades to the home to make it compatible with the heat pump. The lower operating temperatures of a heat pump (when compared with a conventional boiler) mean that the system may need larger radiators (or under-floor heating) and insulation added to the building envelope. Heat pumps and building upgrades need to go hand in hand, otherwise there is a risk of poorly functioning technology getting a bad reputation, with poor energy performance accompanied by low customer satisfaction and loss of consumer confidence. Secondly, while heat networks can in theory provide efficiencies and economies of scale, it only makes sense to invest in the infrastructure of a heat network if demands for heat can be maintained or increased over several years. For large organisations (with multiple buildings in close proximity) or in large-scale new developments, it may be feasible to get a heat network up and running, provided there is a contract negotiated in advance covering energy (or energy services) over several years of operation. But in existing neighbourhoods, where property ownership is highly fragmented and consumers are able to switch energy supplier freely at short notice, setting up heat networks is normally too risky, messy and complex. Countries where heat networks are widespread in existing towns and cities often have governance arrangements in place where local authorities have stakes in effective local monopolies for providing heat (or heat as service). Consumers cannot switch to alternative heat systems where the municipal heat network is in operation.

The switch to electrification of heat (eg using heat pumps) would have implications for the energy system, not only in terms of peak energy demand, but also for energy storage and the effects on the gas industry of having stranded assets in the shape of under-used or obsolete pipes. An alternative to heat electrification is hydrogen in the existing gas grid, although there are still technical challenges around compatibility and safety. Hydrogen can be generated by two principal means: steam methane reformation (SMR), which uses natural gas (methane); or electrolysis of water. Hydrogen generation requires inputs of both electricity and a feedstock (methane or water), which means that hydrogen is relatively costly and inefficient to produce. However, hydrogen has the potential to make use of the existing gas grid, and would also be compatible with heating systems based on boilers. In our pathways to net-zero the uptake of hydrogen for heating is highest in Technology Transformation, because it is less disruptive to household practices and domestic heating supply chains than the heat pump alternative. Other uses of hydrogen are considered in chapter 8.

### 7.1.1 Demand for heat in Oxfordshire's buildings

Gas consumption for Oxfordshire in 2019 was a total of 5.3 TWh (not weather-corrected), the majority of which is demand for space and water heating in buildings.[121] Other end-use applications for gas are also included in the total figure (for example in industrial processes and for cooking). This total consumption came from gas sales related to 238,00 domestic and 3,000 non-domestic meters.

Biomass (e.g. wood burners) is now assumed to be a relatively small part of the future energy mix compared with earlier studies. This is partly because of concerns about indoor and outdoor air quality (ref), but also because it competes with land needed for other uses, and there will be other priorities than heating for the use of what limited biomass resource there is.[122]

Neighbourhood-scale approaches (e.g. heat networks) have the potential to make use of heat that would otherwise be wasted. For example, the Energy from Waste plant at Ardley could provide useful heat to nearby buildings in Bicester, although this idea has not yet been put into practice.

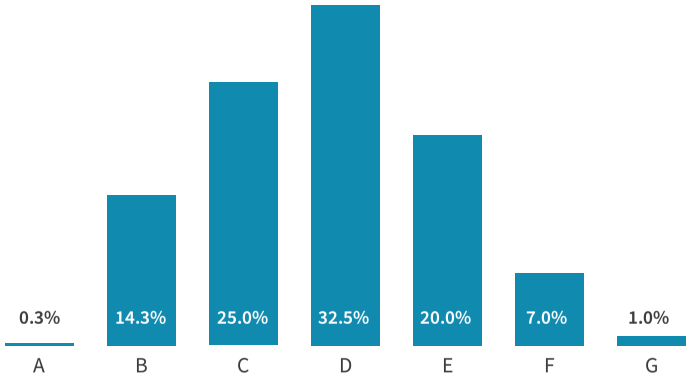
121 BEIS (2020), Regional and local authority gas consumption statistics.

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

## 7.2 The residential sector

Housing growth figures are central to many debates about Oxfordshire's future. From an energy perspective, every new home that is not zero-carbon represents an additional burden to be mitigated by other means, for example through retrofit. New homes are not zero-carbon, so new house-building adds new sources of emissions; and even if new homes become zero-carbon in future, the impacts of existing housing remain to be addressed.

**Figure 7.2: Distribution of domestic EPC ratings in Oxfordshire**




Energy Performance Certificates (EPCs) are required for dwellings at the point of sale or rental, giving an indication of the relative efficiency of the building fabric, heating systems and fixed lighting (but excluding plug-in appliances). The ratings are shown on the familiar A–G scale (A is most efficient; G is least efficient). Although EPCs have been criticised for sometimes being inaccurate and incomplete at the level of an individual dwelling, the distribution of EPC ratings gives an overview of energy efficiency across a stock of buildings. Oxfordshire, like other areas of the UK, has a housing stock grouped around the middle ratings of C–E, which account for over 75% of the total in Oxfordshire (Figure 7.2).

### 7.2.1 New homes

The design energy standard for new homes in England is prescribed in two Approved Documents of the Building Regulations: Part L1A (conservation of fuel and power) and Part F (ventilation). A proposed Future Homes Standard was put out for consultation by the Ministry for Housing, Communities and Local Government in 2019, to which the government response was published in January 2021. It promises to put regulations in place in 2025 for new homes to emit 75–80% less emissions than homes built to the 2013 standard, and for those homes to be 'zero carbon ready' by having electric heat pumps instead of gas boilers. This means, in effect, that the homes will become 'zero carbon' once the grid electricity supply is completely decarbonised. Details of the policy are expected to be published in 2023 ahead of legislation in 2024, coming into force in 2025. In the meantime an interim revision to Part L is promised for 2021, which would lead to new homes emitting 31% fewer emissions compared with the 2013 standard. A 'heat and buildings strategy' is also promised.[123]

Two relevant policies for new housing were scrapped in 2015: the Code for Sustainable Homes and the target for having 'zero carbon homes' from 2016. With Part L of the Building Regulations last revised in 2013, it can be seen that relevant policy for new housing has not only stagnated, but actually gone backwards, in the last eight years.

123 MHCLG (2021), The Future Homes Standard: 2019 Consultation on changes to Part L (conservation of fuel and power) and Part F (ventilation) of the Building Regulations for new dwellings.

Another key challenge for zero-carbon is the so-called 'design-performance gap' between design intent and real-life performance of buildings. Energy consumption in new homes can be 50–100% higher than specified in the design standard, although homes built to the world-leading Passive House standard seem to have a much smaller design-performance gap than conventional homes, as well as being designed to a significantly higher standard.[124]

It is worth noting that the Passive House standard is associated with a whole suite of supporting design tools, training, accreditation, building certification, networks and events.[125] The Passive House approach enshrines a commitment to quality as well as high environmental performance, and this integrated and rigorous approach does indeed seem to lead to high quality outcomes. In contrast, a review of over 100 studies into the design-performance gap in mainstream housing development found three broad causes of the problem, all related to the culture and organisation of project teams:

- Lack of relevant technical knowledge
- Poor communication
- Unclear roles and responsibilities[126]

The implications of the design-performance gap are profound and far-reaching for the construction industry, its supply chains, labour markets and training institutions – requiring significant new national policy to fix.[127] If the design-performance gap is not substantially reduced by changes to construction practices, then the quantity of zero-carbon energy supply will have to be significantly increased for the overall zero-carbon target to be met. Peak demand will also be higher than energy system operators might expect if they do not take account of the design-performance gap in buildings.

There are provisions in the Planning and Energy Act (2008) for Planning authorities to stipulate increased on-site renewable energy and tighter building efficiency standards locally. In addition to using Planning powers, one other possibility for local authorities to accelerate the building of high-performance housing developments is to take a 'public procurement' approach, working with stakeholders to create good quality, new housing to zero-carbon standards ahead of the nationally laid-out timescales. This may provide exemplars to learn from, but it is likely to be time-consuming and require additional funding – a slow and incremental alternative to more ambitious and better coordinated national policy.

124 Johnston, D., Farmer, D., Brooke-Peat, M. & Miles-Shenton, D. (2016). Bridging the domestic building fabric performance gap. *Building Research & Information*, 44(2): 147–159.

125 See Passivehouse.com

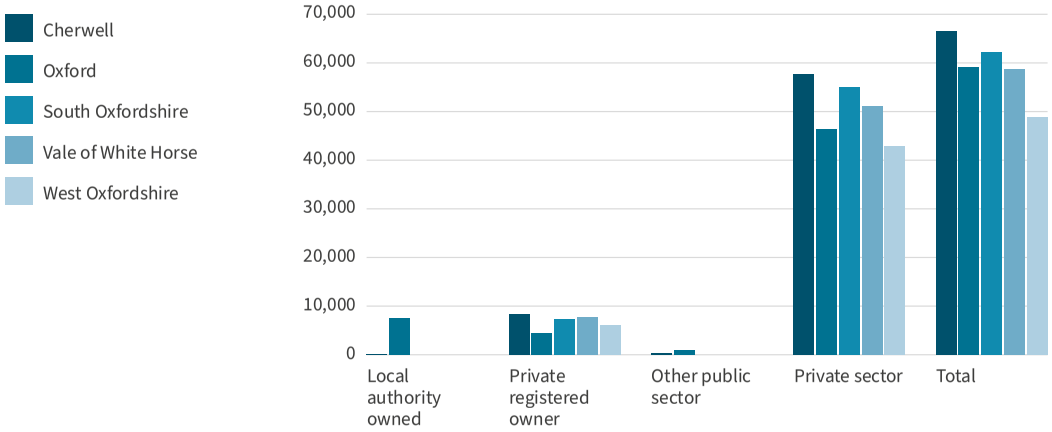
126 ZCH (2014), Closing the gap between design and as-built performance: end of term report. London: Zero Carbon Hub.

127 Killip, G. (2020). A reform agenda for UK construction education and practice. *Buildings and Cities*, 1(1): 525–537. doi: 10.5334/bc.43

### 7.2.2 The existing housing stock

In 2019 Oxfordshire had some 295,500 dwellings, of which 253,000 (86%) were privately owned – either owner-occupied or privately rented. Approximately 6,000 (2%) were vacant. Statistics for the private rented sector are no longer reported separately in government statistics, but in 2017 the private rented sector accounted for 23.5% of the total privately owned stock (and 19.5% of total housing) in GB. Scaling these national figures it can be estimated that nearly 60,000 of Oxfordshire's homes were privately rented in 2019.

**Figure 7.3: Oxfordshire's housing stock by tenure and local authority area, 2019**




## Case Study: Elmsbrook

- A zero-carbon development
- 40% green space to achieve a net biodiversity gain
- One of 11 One Planet Living schemes worldwide

Elmsbrook is a 393 home development, the first phase of NW Bicester eco-town that could eventually provide 6,000 homes and associated infrastructure for Bicester. It is the only UK development to meet the original principles of PPS1 for eco towns and is the largest zero-carbon development in UK. When complete the development will include a primary school, community centre, an eco-business centre and local neighbourhood shops. With cycle and pedestrian routes, a bus stop within 400 metres of every home, live timetable updates in each home, charging points for electric vehicles and an electric car club, residents are being encouraged to adopt sustainable modes of travel. Key features:

- All homes are built to Code for Sustainable Homes Level 5 incorporating high insulation levels, triple glazing, rainwater harvesting and water recycling.
- Timber-frames used instead of brick and block construction.
- PV solar panels installed on every home (34 $m^2$/house) – due to be the UK's largest residential array.
- Heat and hot water come from the community's own combined heat and power plant.

### 7.2.3 Residential heating policy context

Over several decades policy for domestic energy efficiency has been based on single measures (e.g. boiler upgrades; loft or cavity wall insulation), but full decarbonisation will require high-quality and integrated solutions across entire buildings stocks and districts. This will entail better integration of services within the construction sector and new coordination approaches between demand reduction and the energy supply system.

The term 'retrofit' is used to describe an integrated service using a 'whole home' approach, rather than the earlier policy approach based on individual measures. Installation may take place all at once or in a phased 'over time' approach, but in any event it requires high levels of competence in project teams.

The need for integration and quality assurance was highlighted in the 2016 'Each Home Counts' report (also known as the Bonfield Review), which was commissioned in the wake of the failure of the Green Deal policy. New occupational standards have been developed specifically for retrofit: a standard for the new role of 'retrofit coordinator' (PAS 2035 standard); and a standard for installers (PAS 2030). While being broadly welcomed by the construction industry, the Construction Leadership Council has argued that these new standards need to be integrated into an overarching National Retrofit Strategy, covering eight interlocking components:

- Leadership and communications
- Support for research and innovation
- Energy performance standards
- Finance
- Training and accreditation
- Supply chain investment
- Creating consumer demand
- Compliance and quality regime[128]

BEIS commissioned six supply chain 'demonstrator' projects from 2018–2021 (including Cosy Homes Oxfordshire) in order to test different approaches for increasing the rates of energy efficiency improvements amongst 'able to pay' owner occupiers, which represent over two-thirds of households. The evaluation of the 'demonstrators' programme reveals a very immature market struggling in the face of stop-start government policy, and hampered in its final year by the COVID-19 pandemic. Firms in the supply chain do not come forward to take on retrofit without assessing their own possible risks and rewards. Understanding how the sector operates, and de-risking the retrofit task for them, will be important features of any more successful future policy. Without a concerted effort to develop a national retrofit strategy the opportunities for carrying out retrofit work when repair and maintenance work is being planned will continue to be missed, rather than seized. In the current state of the market there is neither sufficient consumer demand nor industry capacity to deliver the type and quality of service needed.

128 CLC (2020), Greening our homes: a national retrofit strategy - a consultative document.

In the private rented housing sector, a Minimum Energy Efficiency Standard (MEES) was introduced in April 2020. To be legally rentable, a property had to have a minimum EPC rating of E, or else an exemption can be filed on a private rented sector 'exemptions register'. The register relies on self-certification from landlords. Local authorities can view the exemption register, providing data on properties and landlords claiming exemptions. This information could be used by local authorities to encourage greater participation in the scheme, although there is no resource to support this work, nor any obligation on landlords to do more than register their exemption.

The most significant energy efficiency programme for vulnerable households in recent years has been the Energy Company Obligation (ECO), run in three phases from 2013–2020. Through ECO over 3 million measures were installed in 2.2m households – most homes had one measure installed.[129] The installation of new boilers, heating controls, cavity and loft insulation all contribute to energy efficiency and improved comfort and well-being for householders. The programme is designed to deliver the relatively quick and cheap measures with the highest ratio of $CO_2$ savings per pound spent; it is not designed to deliver an integrated retrofit consistent with zero-carbon.

129 BEIS (2021), Household Energy Efficiency Statistics, headline release (March 2021).

## Case Study: Cosy Homes Oxfordshire

**Partners: Low Carbon Hub, National Energy Foundation, Retrofit Works. Pilot funder: BEIS**

**The Cosy Homes Oxfordshire initiative (managed by Low Carbon Hub) was one of six national Local Supply Chain Demonstrators run by the Department for Business, Energy and Industrial Strategy (BEIS) between 2018–2021.**

**CHO is based on a business model of quality installation and customer service, intended to take the customer (and their property) on a 'retrofit journey'. Not everything has to be done at once, but there is a 'whole home plan' developed as part of the service, which sets out how each individual property can be upgraded to be compatible with zero-carbon over time, potentially doing the work in stages and fitting in with each household's changing circumstances. As with all of the Demonstrators, CHO has not been able to achieve its targets in the 3 years of BEIS funding, which is due to end in April 2021. The intention is to continue to operate CHO without BEIS support, but the future of the scheme remains very uncertain.**

## Case Study: Springfield Meadows

**Partners: Ssassy Property and Greencore Construction**

- Net-zero embodied carbon from construction. Saving an estimated 1,250 $tCO_2$
- Rooftop photovoltaics are installed on all homes

Springfield Meadows is a small residential development in Oxfordshire that delivers net-zero carbon for both embodied and operational energy. The construction utilises the Biond hemp-lime system to achieve net-zero carbon emissions, while shared outdoor spaces, a wildflower meadow, orchard and pond enhance local biodiversity.

The project has followed Bioregional's One Planet Living® framework throughout the design, planning and construction stages, which not only helps to minimise impact from the construction, but helps create a strong low-carbon community. Ssassy Property plans to establish a management company to deliver a One Planet Action Plan, which will be handed over to residents.

There is no certainty or consensus about how much could or should realistically be done with energy efficiency. Some pioneering retrofit projects have shown that 80–90% emissions reductions are possible at the scale of an individual dwelling, but the technical and practical challenges of such deep retrofits grow exponentially as the performance target rises, as does the capital cost. It may be more realistic to aim for something like 50–60% reductions through energy efficiency, and meet the reduced demand from renewable sources of heat supply. Exploring the technical and cost dimensions of housing decarbonisation could be the focus of a neighbourhood-scale living lab, and would provide useful evidence for future policy locally and nationally. However, widespread adoption of retrofit relies heavily on the national policy context, without which any county-scale actions will be limited to pilots and research projects.

## Case Study: Mixergy

Mixergy®

- Domestic hot water tanks that allow you to heat what you need, saving energy and money and reducing carbon emissions.
- 'Internet of Tanks' – provides flexibility to the grid and enables greater adoption of renewable energy technology
- Up to 20% savings on hot water energy bills

Mixergy is a spin-out company from the Energy and Power Group (EPG) at the University of Oxford, based in Cassington, West Oxfordshire. The company develops and delivers intelligent, cost-effective, and energy-efficient domestic water heating solutions which enable households to live better, save money and reduce their impact on the environment.

Supported by Oxford Sciences Innovation, Mixergy are also the first to intelligently connect a decentralised, digital network of tanks that can provide flexibility to the grid and support the clean energy transition. Already their 'Internet of Tanks' (connected to Internet Of Things (IOT) network) is delivering more than a megawatt of Demand Side Response (DSR) service to the National Grid, using excess electricity from the grid at times of day when there is a greater supply than demand of renewable electricity.

## 7.3 The non-domestic sector

Available statistics on end-use demand in the non-domestic sector are reported nationally, not at county level. In 2019, the national split of end-uses fuels for heat (Figure 7.5) was dominated by gas (40% of total service-sector heat demand) and electricity (38%). The top three sub-sectors nationally for heat demand were offices, retail and hospitality (Figure 7.6). In Oxfordshire the proportions are likely to be different, with health and education probably being higher than the national average.

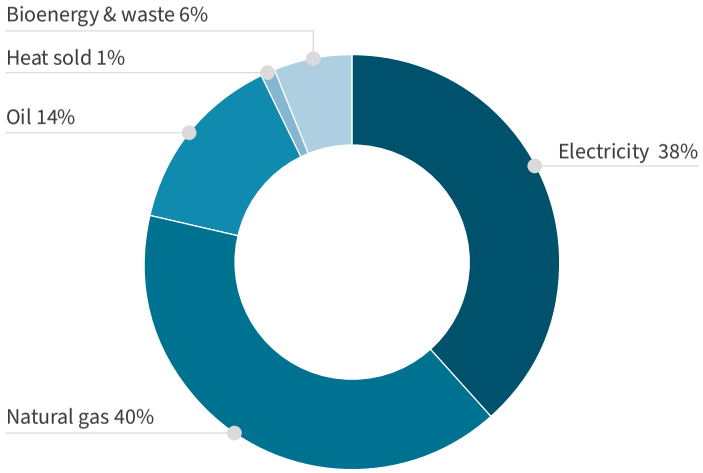
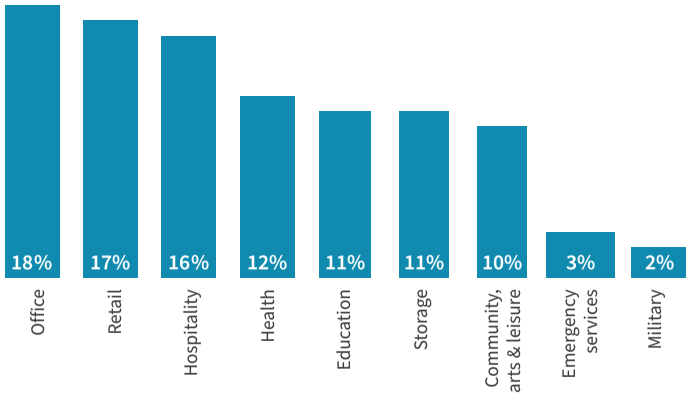



**Figure 7.4: Breakdown of fuels for heating loads in the UK services sector, 2019**

**Figure 7.5:** Sub-sectors of heat demand in the UK services sector, 2019




### 7.3.1 Oxfordshire's non-domestic building stock

In contrast to the data on domestic buildings, the non-domestic building stock is less well documented and understood. According to the Non-Domestic National Energy Efficiency Data-Framework (ND-NEED), there were estimated to be 1,656,000 non-domestic buildings in England and Wales in March 2020. This number is not disaggregated by local authority area in published figures. In very rough terms, the size of Oxfordshire's economy, population and housing stock is approximately 1/100th of national UK data and 1/90th of England and Wales (ie excluding Scotland and Northern Ireland). Applying the 1/90th estimate to ND-NEED data, Oxfordshire's non-domestic building stock in 2020 can be estimated at 18,400 buildings.

### 7.3.2 Energy Performance Certificates (EPCs) and display energy certificates (decs)

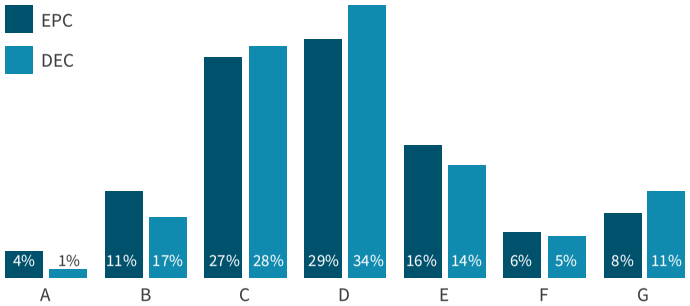
An Energy Performance Certificate (EPC) is required when a property is constructed, sold or rented. Non-domestic EPCs take account of air-conditioning/cooling. In September 2020 a total of 11,800 non-domestic EPCs were lodged for Oxfordshire buildings.

Display Energy Certificates (DECs) are required for larger public buildings over 250 $m^2$ that are frequently visited.[130] Where EPCs record only an 'asset rating' (based on technical parameters of the construction and energy services), DECs additionally record 'operational ratings', which use actual energy consumption to assess operation and management.

Between 2014–2019 there were 3,875 DECs lodged for Oxfordshire buildings. The City of Oxford has higher numbers of DEC lodgements than any of the District Councils. In the same period the City's share of Oxfordshire's DEC lodgements was 45% (by number of DECs) or 60% (by total floor area). This reflects the fact that there are more large public buildings in Oxford city than in other parts of the county.

EPCs and DECs can, in theory, be a useful source of information for improving stock energy performance. However, the coverage and accuracy of building energy labels can be variable, so they need to be used with caution. The distribution of EPC and DEC bands (Figure 7.6)[131] could inform a programme of engagement with building owners with the aim of improving building energy performance through sharing resources and good practice.

**Figure 7.6:** Distribution of EPC and DEC bands in Oxfordshire




130 For a detailed definition and exemption criteria see DECC (2015), Improving the energy efficiency of our buildings.

131 DEC bands are totalled for 2014–2019; EPC bands are upto September 2020; EPC band A includes A+.

## Case Study: OxFutures

**Partners: Low Carbon Hub, Oxford City Council, the University of Oxford, Oxford Brookes University, Cherwell District Council and Bioregional. Funder: MHCLG / ERDF**

- 146 energy audits across Oxfordshire for SMEs
- Delivered 4393 hours of support
- Supported the creation of 4 new low-carbon start ups

OxFutures is a £4.2m project to boost low carbon economic development in Oxfordshire. It is supported by the European Regional Development Fund and run through a collaborative partnership between the Low Carbon Hub, Oxford City Council, the University of Oxford, Oxford Brookes University, Cherwell District Council and Bioregional.

The programme offers free energy audits and grant funding to SMEs in Oxfordshire to identify energy saving opportunities, to reduce energy bills and cut carbon emissions. The project also supports SMEs to develop and bring to market new environmentally sustainable products and services. Support includes knowledge sharing between academics, local authorities and SMEs and providing grant support for new low-carbon start-ups, and those developing new low-carbon products and technologies.

A recently-approved extension of the programme means that it will be able to offer sustainability support to businesses until 2023.

By the end of 2020, the project had:

- Delivered energy audits to 146 businesses with 966 recommendations, of which a third have been implemented
- Supported 28 SMEs with funding to install energy efficiency measures, reducing their energy bills and $CO_2$ emissions
- Awarded grants to a further 14 SMEs to develop new sustainable products and services
- Launched a new business network, Oxfordshire Greentech, which was set up to strengthen knowledge-sharing and trade in the low-carbon sector and deliver a long-lasting legacy from the project

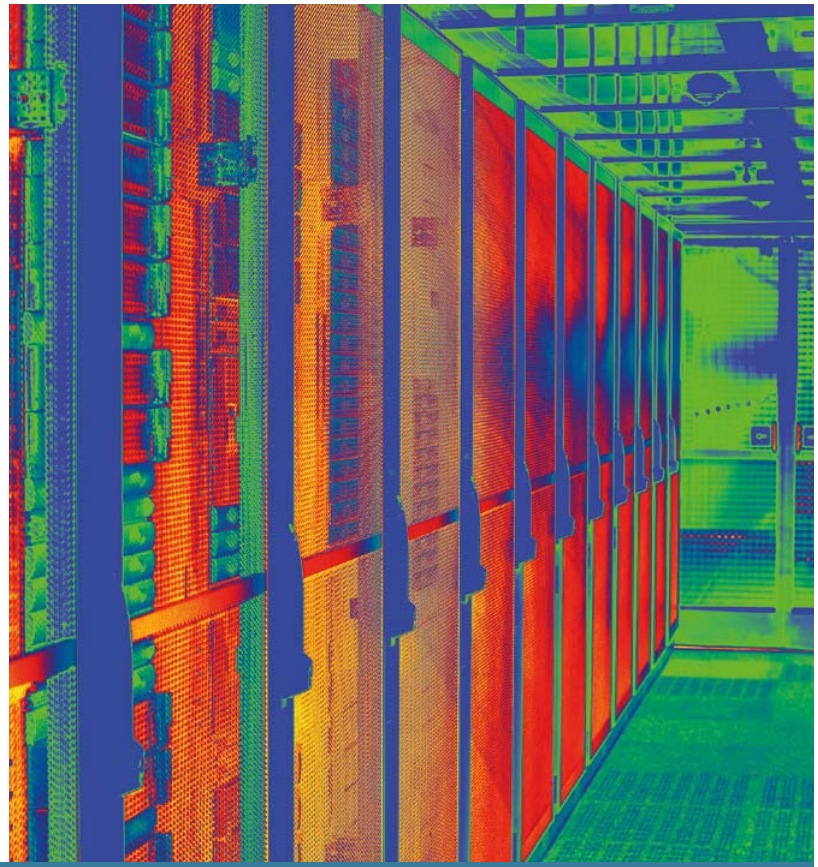
> “The early cash flow from the OxFutures GreenFund Grant allowed us to take the time to foster relationships that helped bring [our] vision to reality, extending the impact of the financial support from our incredible early stage investors and allowing us to develop and test unique new in-house products and services bespoke to the needs of the EV driver.” Holly Peters, EV Carshop

### 7.3.3 Organisations and non-domestic buildings

The non-domestic building sector encompasses a very wide variety of building types, sizes, functions and energy demands. It is therefore not possible to make meaningful recommendations for technologies and building improvements across the whole sector, because what may be appropriate in one case will not be appropriate elsewhere. For non-domestic buildings, a different approach is needed. Instead of focusing on technical interventions, energy performance of buildings can be improved by focusing on the processes of organisational decision-making. One-off investment decisions and ongoing facilities management both have an important role in achieving net-zero. Several elements of good practice can be identified in these processes, for example:

- Energy audits – gathering and analysing consumption data is an important first step in decision-making
- Networks and knowledge-sharing – to disseminate knowledge and promote collaboration
- Senior management commitment
- Effective communication

Some premises occupied by SMEs share characteristics with domestic properties in terms of their physical make up and their potential for improvement (e.g. offices of small professional services companies in converted housing or premises over shops). However, other SMEs are very different (e.g. technology start-up companies with specialist equipment in dedicated facilities). With SMEs, as with other commercial organisations, it is important to understand each firm, its premises and decision-making processes. Improving energy performance requires a process of engagement, not a blanket prescription of technical changes.



## Case Study: University of Oxford Environmental Sustainability Strategy

Oxford University[132] has set a target to achieve net-zero carbon and biodiversity net gain by 2035, focused on ten priorities:

1. **Research** – Increase research and engagement in environmental sustainability.
2. **Curriculum** – Offer all students the opportunity to study environmental sustainability.
3. **Carbon emissions from buildings** – Minimise carbon emissions from energy consumption.
4. **Biodiversity** – Reduce impacts from operations and enhance biodiversity on the University's estate.
5. **Sustainable food** – Reduce carbon emissions and biodiversity impact of the University's food.
6. **Sustainable resource use** – Reduce environmental impacts from consumption and supply chain.
7. **International travel** – Reduce aviation emissions from University staff and student travel, and offset the balance of emissions.
8. **Local travel** – Reduce the need to travel; encourage walking, cycling and public transport; manage car travel demand.
9. **Investments** – Ensure that the University, as an investor, is part of the solution to climate change and biodiversity loss.
10. **Learning from the pandemic** – Build on the potential shift to more environmentally sustainable working practices.

The University will reduce its own emissions (scopes 1–3) as much as possible and use offsetting for the residual emissions in order to reach net-zero carbon by 2035 (taking 2009/10 as the carbon baseline).

The University will account for the biodiversity impacts from developments on its estate, management and operations, and the supply chain. The strategy is to avoid and reduce impacts as much as possible; remediate impacts and use biodiversity offsetting to compensate for any residual impacts. Biodiversity will be overall demonstrably enhanced by 2035 (taking 2018/19 as the biodiversity baseline).

132 Here 'Oxford University' includes the buildings and activities of departments, central administration, Kellogg College and St Cross College. It excludes Oxford University Press and the other 43 Colleges and Halls, which are independent and self-governing.

## 7.4 Neighbourhood-scale heat systems

Neighbourhood-scale approaches to heat have the potential to reduce waste and emissions by making use of heat between and among multiple buildings. Waste heat (e.g. from high-temperature industrial processes) might be reutilised in lower-temperature settings nearby, including space and water heating in buildings, thereby making the energy 'work twice'.

District heating schemes typically involve some form of centralised and relatively large-scale heat plant, connected to local demand sources through insulated underground pipework. Centralised plant has the advantage of being readily accessible for maintenance and, ultimately, replacement. The options of Combined Heat and Power (CHP) or Combined Cooling, Heat and Power (CCHP) can bring significant additional benefits, by satisfying thermal loads (cooling or heating) as well as generating electricity on-site.

## Case study: The Hospital Energy Project

**Oxford University Hospitals NHS Foundation Trust**

**Partners: OUH NHS Foundation Trust; Vital Energi; The Carbon & Energy Fund, Department of Health**

The Oxford University Hospitals NHS Trust is the main provider of acute clinical care for Oxfordshire and surrounding areas. It delivers care across 4 hospital sites, has an annual turnover of over £1bn, employs over 11,000 staff, and has 1.4million patient contacts per year. In 2015 it consumed roughly as much energy as a town the size of Witney (12,000 homes).

The energy system had been in service for over 35 years. It was worn out and unreliable, and it had not kept pace with changes in clinical practice and care services. Some lighting inside the hospitals had not changed since the 1970s and badly needed an upgrade to meet modern needs.

The Hospital Energy Project removed old heating infrastructure at the John Radcliffe and Churchill Hospitals, and replaced it with a more efficient, cheaper system. Work took place between 2015–2017 to install the new infrastructure, and an energy performance contract with Vital Energi guarantees smooth operation and energy costs for the Trust until 2042. A new underground energy link between the John Radcliffe and Churchill Hospital sites allows both to share their energy resources, and to make maximum use of the combined heat and power (CHP) from the new energy centre at the JR.

Technology installed for the Hospital Energy Project included energy efficiency and new energy supply:

- New boilers and chillers
- Combined Heat & Power (CHP) plant (4.5MWe)
- 6,400 new light fittings
- 2.2 km underground energy link distributing heat and power between John Radcliffe and Churchill Hospital sites in Headington
- Improvements to building management system

The project delivered multiple benefits in terms of improved services and savings:

- £11m saved on backlog maintenance over 3 years
- Improved lighting in public and clinical areas
- Virtually no procedures cancelled due to lack of heating or cooling
- Energy link makes best use of energy across 2 sites
- Annual savings of £460,000 and
- >10,000 tonnes $CO_2$ (about one third lower than previous), based on 2015 emissions factors

$CO_2$ emissions savings from CHP are calculated in comparison with the emissions from the input fuel (in this case, natural gas and Heavy Fuel Oil at Churchill Hospital) and also the grid electricity that would have been needed had the CHP not been built. As more renewable generation comes on line, the emissions factor of national grid electricity falls, and the calculated savings from CHP need to be adjusted downwards.

## 7.5 Outlook

All pathways to net-zero require profound and widespread changes to the built environment. Achieving these changes requires a much bolder and more joined-up approach to national policy-making than has been seen in England in recent years. Without a better national policy framework, individual counties (including Oxfordshire) are very limited in what they can achieve for the effective decarbonisation of heat in buildings. For local strategies to prosper, responsibilities and resources need to be devolved to the most appropriate local level. For example, the Association for Decentralised Energy (ADE) argues for a new 'zoning framework' to re-shape the way in which heat decarbonisation in the UK is tackled[107]. Such a framework would assign the resources and powers to local authorities to plan for the future of heating locally, integrating energy efficiency and energy supply (including neighbourhood-scale heat networks) into a coherent strategy for new infrastructure, market development, institutions and governance. Zoning would allow different local areas to develop their own strategic plans for heat, set in the context of clear and consistent national policy. A version of this approach has been trialled through Local Heat and Energy Efficiency Strategies (LHEES) in Scotland. The LHEES pilots carried out in 2018 showed some positive results but also revealed that the voluntary/optional status of the initiative made it a low priority for some stakeholders.[133] For such ideas to have traction, they need some regulatory force behind them.

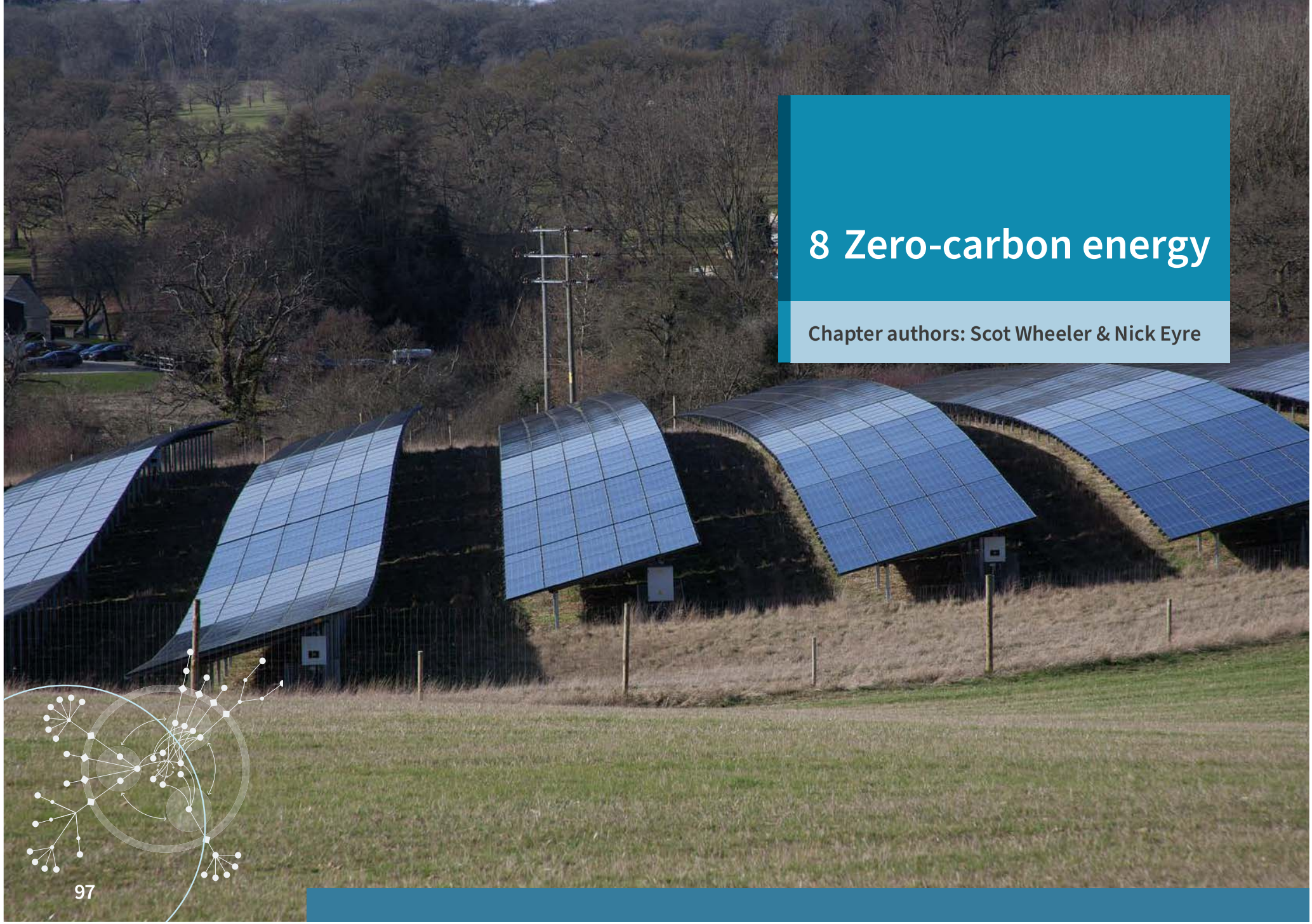
The markets for goods and services to create and maintain low-carbon buildings are small and immature. A much stronger focus on market creation and development is needed if existing technologies are to be deployed at the scale and quality required. New technologies (e.g. digital) may help, but they need to be integrated into viable market offers if they are to succeed at scale. Both the demand and supply for low-carbon heating services need to be stimulated at the same time. The kinds of market signal that are required include regulation to minimum standards, comprehensive financing packages, and consumer-facing information. There needs to be a new focus on the construction and building management industries as essential providers of zero-carbon services. New quality assurance systems need to be built around training, accreditation and robust compliance-checking. To have the required market impact and regulatory force, these changes need to be made at national level. National policy changes that would help include:

- An end to the short-term, stop-start approach to policies and programmes, which has undermined stakeholder confidence and halted progress in recent years
- A return to regular revisions of the Building Regulations with a clear 'roadmap' to zero carbon in line with national carbon budgets and local infrastructure planning
- A new focus on driving out poor quality in the construction sector using a combination of mandatory training and accreditation, backed by independent and properly resourced compliance-checking (e.g. through Local Authority Building Control)
- Regulation of property transactions (sales, leases) to mandate minimum building energy standards, backed by finance packages to provide capital and information campaigns through networks and local agencies

133 Scottish Government (2019), Local Heat and Energy Efficiency Strategies (LHEES): phase 1 pilots – social evaluation.

- Building energy ratings and installer accreditation systems that are robust enough to de-risk zero-carbon building energy services for private-sector investors
- Devolution of powers to regional and local authorities, backed by adequate funding for capacity-building and delivery, with the aim of developing strategic neighbourhood-scale approaches to zero-carbon heat

In the absence of stronger national policy, the opportunities for Oxfordshire to make progress on renewable heat in buildings are limited. A contribution could be made by continuing to initiate research projects and taking part in national demonstrators. These are unlikely to achieve scalable results on their own, but they can provide useful evidence on different aspects of the 'grand challenge' of heat decarbonisation. There is a need for local, context-specific work to help develop markets for construction, management and heating services that are compatible with net-zero carbon emissions. The focus needs to be on governance arrangements and new business models, not just on technology.



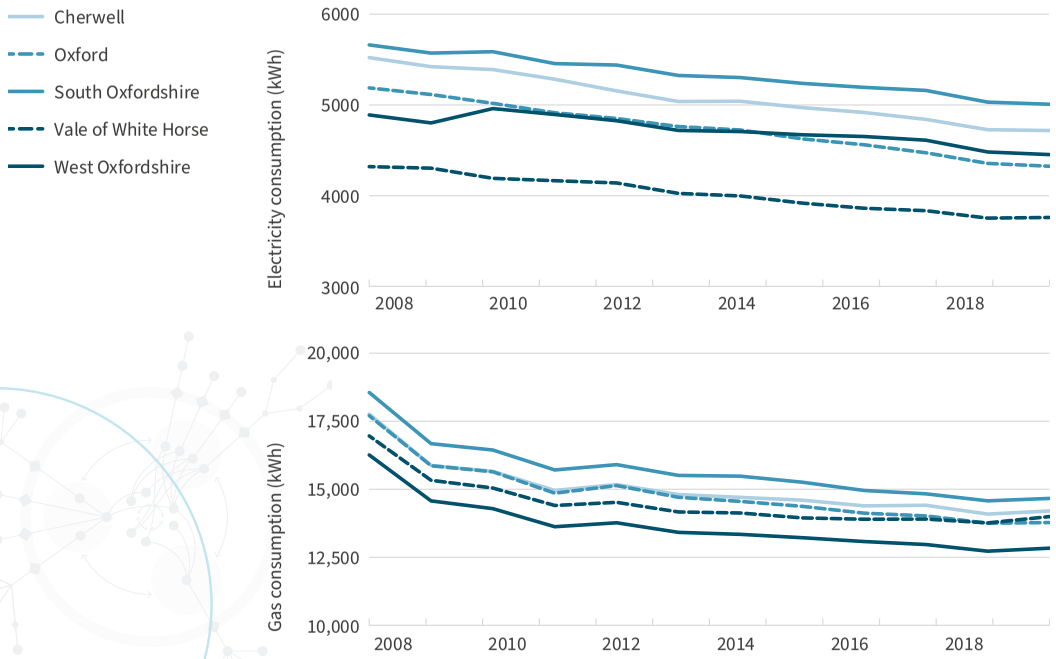
# 8 Zero-carbon energy

Chapter authors: Scot Wheeler & Nick Eyre

## 8.1 Local progress within a national context

If the UK is to achieve net-zero emissions by 2050, a transformation of the energy system is required. This chapter supports the vision set out in the Oxfordshire Energy Strategy by updating on current progress and analysing how the objectives fit within the national energy context which has moved on significantly from 2014. Section 8.2 discusses recent progress towards energy decarbonisation and section 8.3 presents how energy demand is likely to change between now and 2050. Section 8.4 then explores the resource potential which can be exploited within Oxfordshire. Finally, 8.5 highlights the importance of networks – both technological and social – in enabling the transition. As in our scenarios, we draw on National Grid's Future Energy Scenarios to provide context to Oxfordshire's current and future energy transition.

**Figure 8.1: average annual domestic energy consumption per household within each Oxfordshire Local Authority District for (a) electricity and (b) gas between 2008 and 2019**




### 8.1.1 Demand today

Between 2005 and 2014, energy demand in Oxfordshire declined steadily, but has recently stabilised, reaching 17,660 GWh in 2017.[134] Of this total, petroleum products accounted for 45% (7,919 GWh), gas 30% (5,342 GWh) and electricity 20% (3,601 GWh). Figure 8.1 compares the annual domestic electricity and gas consumption per household across all district council areas, all of which show a negative trend. Electricity savings can be attributed for the most part to more efficient appliances and LED lighting, while falling gas consumption is driven by efficiency improvements of existing housing stock, and the building of new homes with relatively higher energy efficiency.

### 8.1.2 Low carbon generation today

Oxfordshire's strengths within the energy sector are led by its advanced research and innovation capability. However, this has not necessarily translated to accelerated mass adoption of low carbon energy technologies when compared to other southern regions of England. While this is partly due to Oxfordshire's position as a central, low lying, landlocked county, limiting natural renewable potential (specifically hydro and wind) relative to other regions in UK, a significant solar resource exists which must be further exploited as part of any net-zero transition.

134 BEIS, Sub-national Total Final Energy Consumption Statistics 2005–2017.

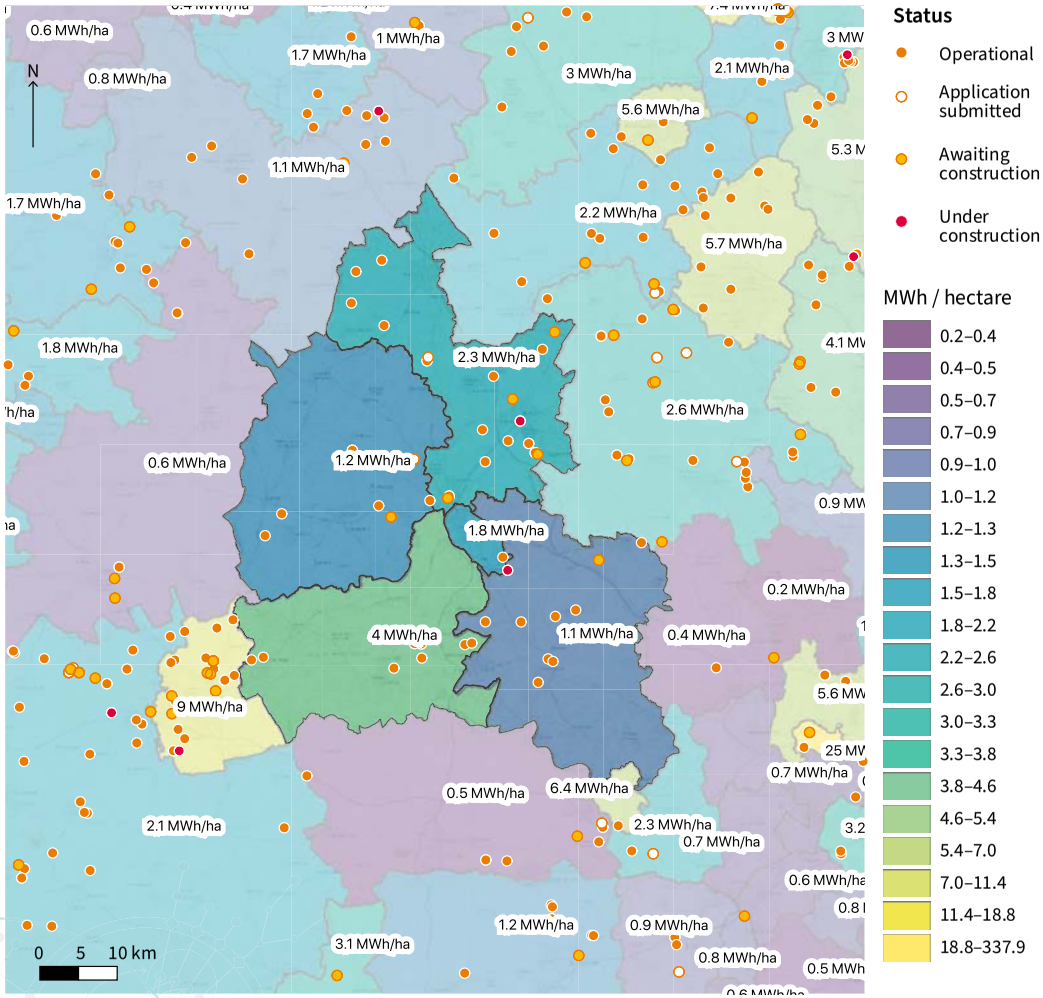



**Figure 8.2: Low Carbon Energy Oxfordshire Map: the shading (and associated numbers) displays the low carbon renewable electricity energy generation per hectare (MWh/ha) of each Oxfordshire Local Authority District and surrounding area[39]. The orange circles indicate the position and development status of major renewable energy installations**

According to government renewable energy statistics39, Oxfordshire's total annual renewable energy generation for 2019 was 533 GWh (with an installed capacity of 453 MW). The map in Figure 8.2 shows how this is broken down by district, normalised per hectare.[135] Vale of White Horse, a rural district, accounts for 44% of energy generation and Oxford City 2% reflecting the relative urbanisation of the different regions. Within the context of Great Britain (excluding NI), Oxfordshire contributes just 0.6% of a total 116.6 TWh, half that of its population share and contribution to $CO_2$ emissions. Despite having a share of 1% of national generation capacity, the share of energy generated is lower as the main source is solar PV, with a lower capacity factor (~11% cf. 40% for offshore wind).[136] This places Oxfordshire 41st out of 150 counties and Unitary Authorities in Great Britain for absolute renewable energy generation, 68th on a per household basis, and 100th on a per hectare basis. Within the context of Oxfordshire itself, local renewable electricity generation contributes 3% towards total energy demand and 14.8% of total electricity demand.

**Solar PV** currently accounts for 72% of Oxfordshire's renewable mix (85% of capacity), generating 382 GWh of energy in 2019. This represents 3% of national solar generation meaning Oxfordshire contributes roughly three times the solar generation compared to its population share. To put this in context, Oxfordshire ranks 9th out of 150 GB Counties and Unitary Authorities for absolute solar energy generation, a great achievement but behind comparable counties in terms of area, solar resource and social demographic, including the likes of Wiltshire, Cambridgeshire, Hampshire and Kent. Normalising on a per hectare basis to account for region size, Oxfordshire ranks 32nd, while accounting for population, on a per household basis, Oxfordshire is 15th.

135 BEIS Renewable Energy Planning Database, September 2020.

136 DUKES 2020, Chapter 6: statistics on energy from renewable sources.

These standings for solar have remained constant over the last five years, indicating that progress has been in line with peers. There are more than 10,000 registered installations, ranging in size from <10 kW domestic rooftop solar to large 35 MW ground mount installations.[137]

**Landfill Gas** (16.5%) is the second highest contribution to Oxfordshire's renewable generation with 15 MW of installed capacity registered through the Renewables Obligation (RO) scheme located at Ardley and Sutton Courtney. Generation from landfill gas is expected to decline as waste sent to landfill is reduced. The government's renewable energy statistics does not include energy generated from the 27 MWe Ardley Energy Recovery Facility (ERF) located near Bicester, which generates 218 GWh of electricity per year from over 95% of Oxfordshire's residual municipal waste which would otherwise go to landfill. Oxfordshire County Council estimate at least 30% of this waste is biodegradable and could be classed as renewable. However, incineration alongside non-biodegradable waste produces high carbon emissions (0.44 $tCO_2$/MWh) per unit of energy,[138] double that of the current UK electricity grid, and is unlikely to be significant in a future zero carbon electricity system.

There are six **Anaerobic Digestion** (AD) facilities across the county generating 7.5% of Oxfordshire's renewable generation. The largest of these, Cassington AD and Wallingford AD are owned by Severn Trent Green Power and between them, they accept all domestic food waste and some commercial food waste (depending on specific District Council arrangements) from Vale of White Horse, South Oxfordshire, West Oxfordshire and Oxford City; this only accounts for part of the total feedstock, with other commercial contracts and local authority imports making up the rest.

The methane generated is used onsite for electricity generation, providing 2.4 MWe and 2.1 MWe capacity from Cassington and Wallingford respectively, enough energy to power 5,000 homes annually. Cherwell's food waste is currently processed at an In-Vessel Composting (IVC) facility at Ashgrove Farm, Ardley, and not used for electricity generation. There are two Sewage Gas plants within Cherwell and South Oxfordshire, the largest of these being the 2.4 MW facility in Didcot, notable in 2010 as being the first demonstration of biomethane from sewage being injected into the national grid.

The main **onshore wind** resource within the county is the community owned 6.5 MW Westmill Wind Farm in the far south west of the county which was erected in 2008 generating around 11 GWh per year since then; it sits alongside the 5 MW Westmill Solar Farm which was developed in 2012. Since then, no further significant onshore wind development has happened, hampered by unfavourable national policy for onshore wind and local planning challenges.

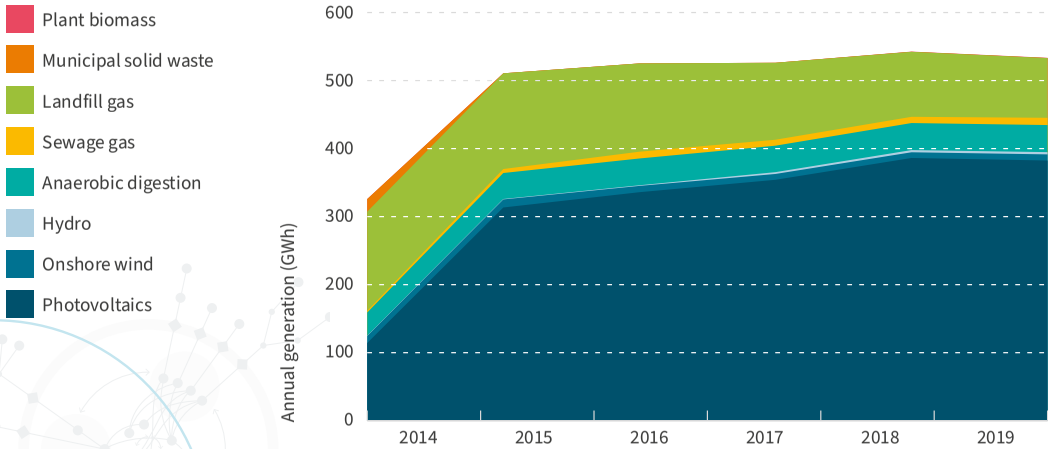
Finally, for electricity generation, **hydro** contributes 3.3 GWh per year and has seen a notable expansion in capacity over the last 5 years with the completion of the community owned 49 kW Osney Lock Hydro, a 400 kW privately owned plant at Culham Weir in 2016, and the community owned 400 kW Sandpford Lock Hydro completed in 2017. Sandford Lock Hydro was developed and is operated by the Low Carbon Hub on behalf of local community members who instigated the project via a community share offer run by the Low Carbon Hub, raising £1.4m of investment.

137 OFGEM, FiT Database 2018.

138 Birmingham Energy Institute (2020), Energy from Waste and the Circular Economy.

Figure 8.3 shows how renewable electricity generation has changed through the period 2014–2019; strikingly, installations have plateaued with generated energy increasing by less than 5% in 4 years. Between 2014 and 2015, capacity was still increasing sharply thanks to a favourable Feed-in-Tariff (FiT) rate of around 16 p/kWh for solar PV; that year Oxfordshire saw an increase of 126 MWp in solar PV alone. From April 2016, the FiT rate dropped just under 5 p/kWh and was abolished from April 2019, with the effect on new installed capacity dropping to an average of 10 MW per year since 2016 (just 1.4 MW in 2019). According to the Renewable Energy Planning Database maintained for BEIS[119], as of December 2020, there is around 133 MWp solar PV capacity which had either been submitted for planning permission, had planning permission granted or is under construction. This indicates a possible near-future resurgence of renewable generation installations indicating that continued technology cost reductions are making business cases stack up without subsidies.

**Figure 8.3: Low carbon electricity generated by technology type between 2014 and 2019[39]**




Evaluating progress on **heat** decarbonisation is more difficult due to few details being recorded centrally for biomass boilers, wood-stoves and heat-pumps which can be broken down at region level. BEIS record the number of installations supported by the Renewable Heat Incentive (RHI) broken down by technology type on an annual basis. As of December 2020, the number of installations (and capacity based on a national average per installation) are: air source heat pumps: 858 (8.6 MW), ground source heat pumps: 239 (3.3 MW), biomass systems 104 (2.7 MW) and solar thermal: 165 (0.5 MW). This totals 1,366 installations with an estimated combined capacity of 15 MW, providing an estimated 75 GWh of heat. This represents less than 1% of the estimated county heat demand, although the real figures of such technologies are likely to be slightly higher than reported. For the non-domestic sector, there are a total of 185 installations with an installed capacity of 46 MW; based on average distribution per technology type for the South East, 75% of these are solid biomass boilers. DFES analysis undertaken by SSEN for their 2019 baseline indicates the number of heat pumps in Oxfordshire could be higher at around 4000.

## Case Study: Energy Superhub Oxford

Energy Superhub Oxford

**Partners: Pivot Power, Oxford City Council, Habitat Energy, Kensa Contracting, Invinity Energy Systems, and University of Oxford. Funder: Innovate UK**

- 50MW hybrid battery system
- Transmission grid connected electric vehicle network
- Ground source heat pumps with innovative smart controls

Energy Superhub Oxford (ESO) is one of three demonstrator projects supported by UK Government's Industrial Strategy Challenge Fund. Integrating innovation in transport, electricity storage and heat, it aims to accelerate the development of a smart, low carbon energy system for the city, eliminating 10,000 tonnes of $CO_2$ in its first year of operation.

The project involves installing the UK's first transmission grid-connected hybrid battery storage system, comprising 50MW lithium-ion and 2MW vanadium flow batteries. These will help to maximise the usage of renewable electricity across the UK and provide local services such as rapid EV charging. The benefit of combining a vanadium flow battery with lithium-ion is that the two technologies behave in different, complementary ways.

Flow batteries do not degrade, and so will be deployed for rapid cycling of small quantities of electricity, preserving the performance of the lithium-ion for larger trades.

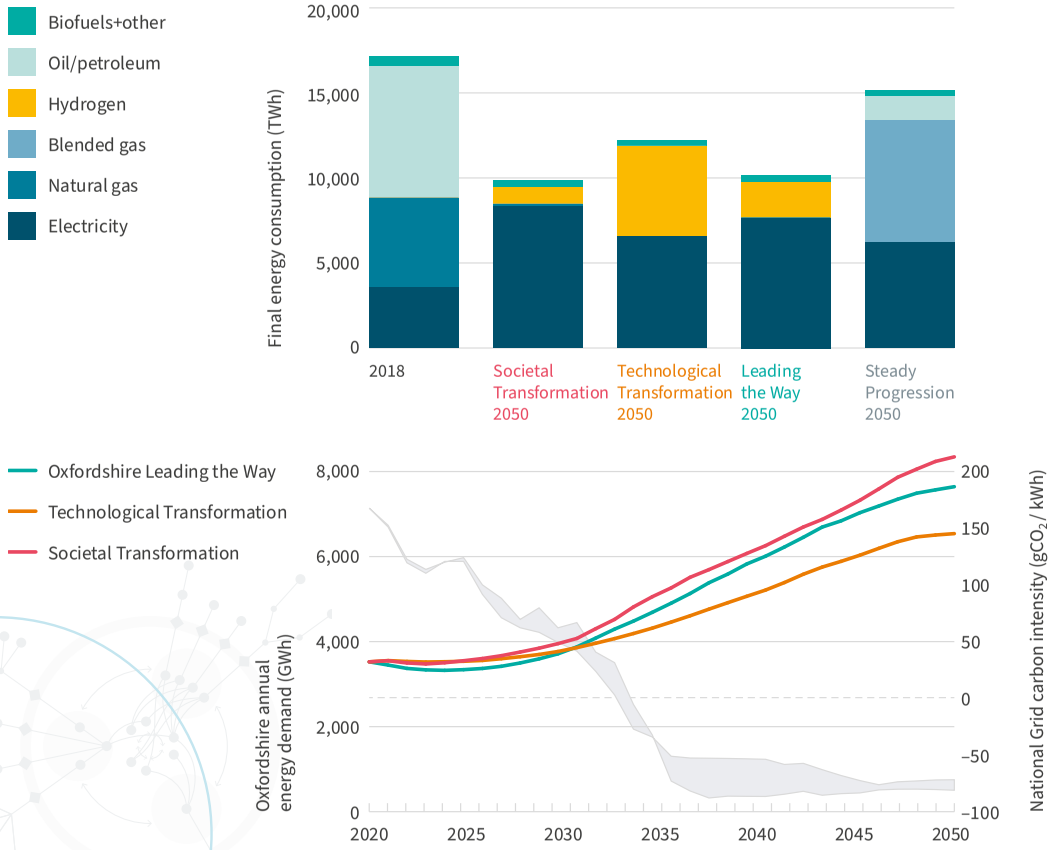
The EV network will be the first to connect to the National Grid's transmission network, delivering power to supply up to 100 ultra-rapid chargers. ESO is also exploring 'smart' charging, whereby charging prices will vary according to demand and the availability of renewable power. The project has already enabled the City Council to electrify a substantial portion of its vehicle fleet and install rapid charging points at its Cowley depot. Work is beginning on the 8 km cable system construction to Redbridge Park & Ride which will become the UK's largest public EV charging hub.

Ground source heat pumps combined with smart controls and time-of-day tariffs will provide low carbon heating for social housing in Blackbird Leys and elsewhere.

**Figure 8.4: Top – forecasted annual end consumer energy demand in 2050; bottom – forecasted annual electricity demand (colours, left axis) and national grid carbon intensity (grey, right axis) for Oxfordshire net-zero pathways**

## 8.2 Oxfordshire's future energy transition

To achieve net-zero, transformations will be needed in the ways that energy is used, generated and delivered. While change will be driven by the transformation of the national energy system guided by central government policy instruments, how it is implemented at a local level, particularly the speed of transition, could be heavily influenced by Oxfordshire's community ambition.



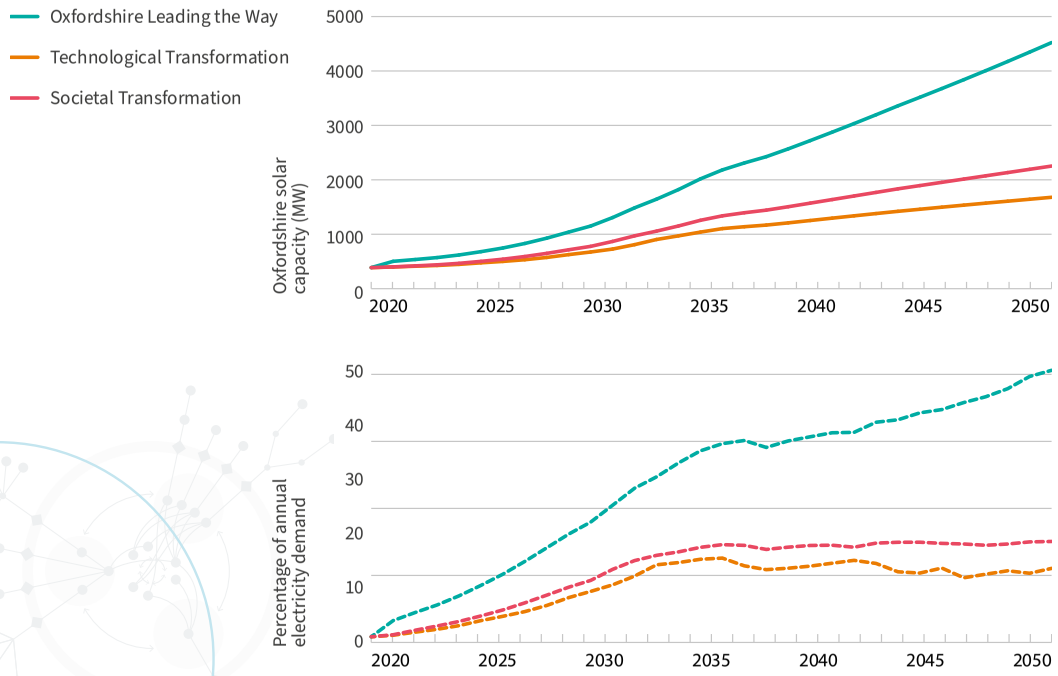

The transition is a story of two parts: energy efficiency and vector change. The route to net-zero will be influenced by society's ability to adopt new technologies and behaviours. This section builds on the three distinct pathways to net-zero developed in Chapter 4.

Energy efficiency is vital for a rapid transition to zero carbon emissions as it reduces energy demand and therefore, the energy generation capacity required. Energy efficiency will be achieved through traditional building fabric improvements but also the shift away from inefficient fossil fuelled heat and transport technologies to more efficient technologies such as heat pumps, electric vehicles and fuel cells. Figure 8.4 (a) shows Oxfordshire's forecasted annual end consumer energy demand in 2050 for all four scenarios where total energy demand is lower than the 2018 baseline as a result of energy efficiency measures. In the three net-zero scenarios, annual final consumption is forecast to be between 9.8 – 12.2 TWh.

Each of the net-zero scenarios involve complete vector change, away from natural gas and petroleum, with their replacements dependent on the complex interaction of policy, markets, technology, environment and user aspiration, spanning the whole system. For example, our **Societal Transformation** scenario represents a system dominated by electricity where users have adopted new, more efficient technologies and practices, whereas the **Technological Transformation** scenario sees extensive use of hydrogen for heating after 2035 as a direct replacement for natural gas.

Electrification is likely to be the dominant vector for the future of transport, particularly in the domestic and light commercial sectors. In addition to the electrification of heat, the result is rapidly increasing electricity demand in all scenarios from 2025 onwards as displayed in Figure 8.4 (b).

**Figure 8.5: Oxfordshire PV growth scenarios for Societal and Technological Transformation representing 3% of national solar generation and Leading the Way representing an increase to 6% of national PV generation by 2050. Top: Oxfordshire installed solar capacity (MW). Bottom: solar energy generation as a percentage of local electricity demand**




Due to the relative technical ease of generating electricity from renewable sources, electricity supply is expected to achieve rapid decarbonisation in the short-medium term. National Grid predicts that the electricity sector will achieve net-negative emissions by 2035 (shown in grey on the right axis of Figure 8.4 (b)), due to extensive deployment of BECCS (bioenergy with carbon capture and storage), which will be required to offset residual emissions in other sectors; the CCC expect less ambitious electricity decarbonisation, reaching 100% low carbon generation by 2035, but not achieving negative emissions before 2050. In either case, widespread electrification offers the fastest and clearest route for emission reductions in Oxfordshire.

## 8.3 Enabling the transition – resource

### 8.3.1 Generation

As highlighted above, **solar** is by far Oxfordshire's largest renewable resource and this will continue to be the case. As a southern county, insolation levels (amount of solar energy per unit area) are higher than most of the UK which should make it a favourable place to locate future PV generation, assuming grid connection fees and the cost of land or its use are not prohibitive. While Oxfordshire should at least aim to sustain (in relative terms) its high contribution to national solar generation, the question remains how much further Oxfordshire could (or should) go? The energy system does not follow geopolitical boundaries so while Oxfordshire cannot decide this alone, the county should push for, and lead on the delivery of, an informed national strategy that ensures a cost effective and equitable system. The FES 2020 scenarios predict between 42 TWh and 64 TWh of solar generation in the UK by 2050, requiring roughly 1.4 GW new capacity added to the grid per year. In our **Societal** and **Technological Transformation** pathways, Oxfordshire maintains its current 3% proportion of national solar supply. As shown in Figure 8.5, this implies a need to generate between 717–852 GWh/yr from solar by 2030 (728 – 868 MW of capacity) and between 1,377 and 2,092 GWh/yr by 2050 (1,679 – 2,253 MW of capacity). This is an increase of between 3.5–5.5 times that of current levels, requiring an additional 43 – 62 MW per year for the next 30 years. This already represents a giant challenge in the context of the 10 MW per year achieved over the last 5 years.

The green line in Figure 8.5 represents a more ambitious local solar pathway, which increases Oxfordshire's contribution to national solar generation from 3% today to 4% in 2030 and 6% by 2050. This leads to 3,868 GWh/year of solar generation in 2050, 1.8 times more than the **Societal Transformation** scenario, requiring a huge 138 MW per year for the next 30 years.

While high ambition is important to build momentum early in the transition, to benefit from such a pathway, Oxfordshire should ensure that financial benefits from its solar capacity are kept local by utilising flexibility to minimise imports and encourage local ownership. From just a carbon perspective, as the national grid decarbonises, the marginal benefit of additional local solar capacity lessens which could impact investment justification. In the extreme case of negative national supply, additional solar capacity beyond our relative national share, could reduce Oxfordshire's ability to offset other hard to decarbonise sectors through electricity.

In terms of local supply, these scenarios for local renewable generation equate to between 23% and 52% of estimated final electricity consumption in 2050. These figures are lower than previous targets recommended in the 2014 Low Carbon Economy report and picked up in the Oxfordshire Energy Strategy (primarily due to higher electricity demand from greater electrification, absolute solar capacity remains similar). However, in light of recent decarbonisation success and more proactive policies at the national level, these represent ambitious and fair contributions from Oxfordshire. UK policy is tending to favour offshore wind due to rapidly falling costs of (66% over the last 4-year period)[139] by committing to increasing capacity to 40 MW by 2030, up from 10 MW today. Such a move will decrease the relative contribution of solar nationally, which could impact the amount of solar which is economically feasible or technically favourable in Oxfordshire. This in turn would reduce the percentage of local demand met by local renewables, without necessarily influencing Oxfordshire's ability to achieve zero carbon emissions.

Depending on how the cost of solar changes over the next 30 years,[140] these targets require of the order of £1.3bn to £3.4bn of solar CAPEX investment (£42m – £110m per year for the next 30 years) based on solar costs of £750/MW. If directly offsetting local demand, this could see a collective £190m – £540m per year saved on avoided electricity imported from the national grid by 2050. However, in practice, making a business case for solar work under current market uncertainty is extremely challenging since the slightly premature removal of the FiT subsidies. As alluded to by the Low Carbon Hub in their recent Project LEO report 'Plug-in Projects – Year 1 Review',[141] the particular lack of long-term visibility of new revenue streams and lack of recognition of any local network benefits currently favours only exceptional projects which combine: large scale (>10 MW), high percentage of self-consumption, availability of long-term Power Purchase Agreements (PPAs) and low-cost availability of grid connections. Without market reform and revenue stability at a national level, it is critical to work with local partners including landowners, local organisations and the DNO to maximise local collaboration on each of these factors. However, as PV and storage prices continue to fall, installations are expected to become increasingly cost competitive again. On a positive note, local support for recent community energy funding has been high, and the Low Carbon Hub is in the process of developing Ray Valley Solar which at 19 MW is thought to be the largest community-owned solar ground mount in the UK, having raised the required £3m target in record time. From initial design, Ray Valley Solar will have the technical and commercial components integrated to make it 'flex-ready' and capable of participating in local and national flexibility markets.

139 Reported change in offshore wind prices in the renewable Contracts for Difference auctions between 2015 and 2019. HM Government (2020), Energy White Paper.

140 Using a figure of £43/MWh over a 20-year lifespan. Committee on Climate Change (2020);,The Sixth Carbon Budget – The UKs path to net-zero.

141 The Low Carbon Hub (2021), Plug-in Projects – Year 1 Review.

## Case Study: Project Local Energy Oxfordshire (LEO)

**Partners: Scottish & Southern Electricity Networks, University of Oxford, Oxford Brookes University, EDF Energy, Piclo, Oxfordshire County Council, Nuvve, Low Carbon Hub, and Oxford City Council.**
**Funder: Innovate UK**

Project Local Energy Oxfordshire (LEO) is creating a smart grid trial to increase our understanding of future smart electricity system models and best practices to transition. This includes understanding the relationships between actors within this emerging energy system, identifying how markets can be unlocked and grown, and skills enhanced. The project involves:

- Designing, developing and demonstrating Market Platforms for Oxfordshire's Local Energy System
- Developing a range of "Plug-in Projects" to test new technologies and business models for enabling network optimisation, flexibility and trading.
- Analysing local energy assets and dynamically controlling energy generation and demand
- Supporting the local Distribution Network Operator to develop the competencies, processes and business models for becoming a Distribution System Operator (DSO).

Another consideration for such a solar commitment is the equivalent land area required to achieve the 2–4 GW capacity identified for 2050 above. Based on 1 MW/hectare for current module efficiencies, the additional capacity identified would require 1,200–2,600 hectares of land or between 0.45–1% of Oxfordshire's land area. This could be reduced by over 50% with the introduction of higher efficiency modules such as those based on perovskite materials being developed by Oxford Photovoltaics. A recent desk-based study undertaken by Energeo in 2020 for Oxfordshire County Council as part of Project LEO identified 46,000 hectares of land which in theory is suitable for ground mount PV.[142] Competition between energy generation and agricultural land use could be minimised by exploring novel 'aglectric' installations which avoid diminishing agricultural output. This could involve raised installations (4m or higher) to allow equipment or livestock movement underneath, adjustable installations which could change orientation during growing seasons or the use of semi-transparent or bifacial panels to minimise shadowing and maximise collection of diffuse light.[143]

142 This analysis excluded Grade 1 and 2 agricultural land, conservation zones, greenbelt land and woodland amongst other criteria.

143 Miskin et. al. (2019), Sustainable co-production of food and solar power to relax land-use constraints.

Ground-mounted solar is not the only option, rooftop solar will continue to contribute as prices fall to make PV an attractive investment opportunity again in a FiT-free market. However, soft costs including construction and labour represent a larger proportion of total installed system costs for rooftop solar which are not falling as sharply as module and inverter costs.[144] The table below provides a breakdown of PV figures by capacity for Oxfordshire based on analysis of the 2018 FiT database, BEIS Renewable Energy Statistics by Local Authority and the Renewable Energy Planning Database. While rooftop PV is estimated to account for 99% of installations in Oxfordshire, it only accounts for around 20% of total capacity. This might be expected to vary within the range 10% – 30% depending on how attitudes and policy towards rooftop solar change over the next 20 years.

| | Installations | Installation (%) | Capacity (MW) | Capacity (%) |
|---|---|---|---|---|
| Oxfordshire Total | 10,096 | | 387 | |
| Rooftop | 10,068 | 99.7 | 74.6 | 19 |
| Under 10kW* | 9,565 | 95.0 | 36.0 | 9.3 |
| 10kW – 150 kW* | 454 | 4.5 | 20.9 | 5.4 |
| Ground Mount (>1MW) | 28 | 0.3 | 312.7 | 81 |
| *estimated from FiT database. | | | | |

144 NREL (2020), Solar Installed System Cost Analysis.

A 2012 study by McCulloch and Alkiviades with the Low Carbon Hub assessed rooftop PV potential in Oxfordshire and found the total annual solar resource striking existing Oxfordshire rooftops was equivalent to 2,055 GWh/year (around 2.1 GW); this would meet 57% of current electricity demand and 25–31% of demand projected in our 2050 scenarios. With the large numbers of new housing planned for Oxfordshire, including rooftop solar at build stage to reduce retrofitting costs is a must. Based on the average 4 kW per house achieved on the Bicester eco-town development, the 65,000 new houses yet to be built by 2031 offer 260 MW of potential solar capacity, equivalent to 250 GWh of annual energy generation. The current National Planning Policy Framework and Building Regulations provide little to no incentive for master planners and developers to include solar as standard on newbuilds. While local planning authorities have some ability to dictate better practises through their Local Plans, these are not straightforward taking years to develop, open to challenge and liable to change with different political regimes; there are few examples of this being used successfully even with declared climate emergencies.[145]

**Solar thermal** is another form of renewable generation which can be installed on rooftops and works by absorbing heat from the sun to heat water. As with solar PV, Oxfordshire's solar resource due to its position in the south is beneficial. However, despite efficiencies up to 90% (compared to solar PV's 15–20%) and subsidies through the RHI scheme, the case for solar thermal rarely stacks up against solar PV for several reasons. Installation costs are typically around £1,400/kW – similar to solar PV but the energy generated is less versatile. Solar thermal requires hot water tanks which are becoming less common as homeowners seek to maximise living space (for more details on how hot water tanks can be used for flexibility, see Mixergy case study in Chapter 7).

145 Oxfordshire County Council (2020), Oxfordshire Cotswold Garden Village Energy Plan.

Finally, annual cost savings on bills are lower if replacing gas due to the relative mismatch in electricity and gas prices. However, in certain cases where roof space isn't limited, particularly for non-domestic applications, solar thermal should continue to contribute, albeit in a small way, to local renewable generation.

While **onshore wind** is the cheapest form of energy generation in the UK at present, Oxfordshire's wind resource is low as a result of modest wind speeds compared to coastal and upland parts of the country. The greatest potential based on wind power density is in the south of the county along The Ridgeway or the Cotswolds to the north west; however, these are also designated AONBs. Energeo's desk-based study for the County Council identified just 1% of Oxfordshire might be suitable for onshore wind, with a potential capacity of 7 GW (in comparison to 46 GW for solar PV). Previous studies for West Oxfordshire District Council and Cherwell District Council have also highlighted the potential conflicts between onshore wind development and safeguarding zones associated with military air bases located throughout the county.[146] A new wind energy study for Cherwell District Council is due to be published in 2021 as part of the evidence base for the Cherwell Local Plan Review 2040.

A small number of micro-**hydro** installations have been developed on the River Thames in recent years. However, the remaining usable resource for electricity generation is minimal and barriers such as raising support from locals and river users have been high. There is potential for heat from Oxfordshire's waterways to be exploited through water source heat pumps (WSHP) for buildings near the riverbank or through larger district heat networks. District heat network studies commissioned by South Oxfordshire and Vale of White Horse District Councils for Didcot Garden Town and Culham found the inclusion of Thames connected WSHP could have significant carbon emissions savings but are only financially viable in some limited cases.[147]

Nationally, **bioenergy** has an important role in decarbonising the energy system. When combined with carbon capture and storage (BECCS), it is one of the technologies that can deliver negative emissions needed to offset residual emissions from other sectors. Bioenergy requires a sustainable feedstock which is influenced by the availability of natural resources, waste management and competition with other land uses. All the National Grid scenarios use bioenergy, mainly for power generation, but also in residential biomass boilers, heat networks, difficult to electrify industries (e.g. cement) and biofuels for aviation. As a rural county with around 1% national land area, Oxfordshire arguably should contribute to national bioenergy production (discussed further in Chapter 9 – Land Use), however local demand is expected to be low. Biogas from waste for electricity production is more likely but with all food waste in the county already being used in existing AD plants, any new growth is limited to agricultural waste feedstocks. There is untapped potential to utilise waste heat at AD facilities such as Cassington and Battle Farm which is close by to RAF Benson and Wallingford.

146 CAG Consultants (2009), West Oxfordshire and Cherwell Renewable Energy and Sustainable Construction Study.

147 AECOM (2017), Didcot Garden Town Heat Mapping and Masterplanning.

Although progress has been slow for **hydrogen**, it is set to play an important role in the future energy system with the Government's recent white paper outlining plans for 5 GW of production by 2030[148] and the FES 2020 identifying at least 190 TWh of energy for hydrogen production in all net-zero scenarios. Hydrogen will either be directly used to replace gas heating where heat pumps are not feasible, or as seasonal storage in a highly electrified scenario. It is also likely to play a role in long distance and heavy transport, shipping and high temperature industrial processes. One barrier for the shift to hydrogen is that it resists incremental change. Repurposing the gas grid for hydrogen requires a major step-change, in contrast to the incremental decarbonisation of the electricity system. Hydrogen is typically produced near where it is used, and it is likely to be generated by either reforming natural gas (Blue Hydrogen) close to the North Sea, or where there is an excess of renewable generation for use in electrolysis (Green Hydrogen). It can also be converted to ammonia for transportation since ammonia stores almost twice as much energy per unit as liquid hydrogen. An ammonia demonstrator at the Harwell campus provides a knowledge base for future development of this technology in the region and is discussed further in the case study below.

The use of hydrogen is uncertain but local heating demand in Oxfordshire might exist in urban centres where existing CHPs and heat networks are converted to hydrogen, or where space limits ground-source and air-source heat pumps. SSEN's DFES analysis predicts in one of its scenarios that Oxford City could see 10 MW of hydrogen generation by 2050.[149] Demand from HGV transport might come from a number of distribution centres located within the county, like those around Milton Park and Didcot, and the major roads, A34 and M40, which pass through the county.

There may also be military transport and heat demand for hydrogen, with Oxfordshire host to a number of RAF bases and barracks. Finally, if future solar penetration is high, there may be times where generation exceeds local demand or exceeds local network limits, meaning that hydrogen could be generated using electrolysis behind the meter.

The **decarbonisation of heat** is one of the harder challenges faced by the UK. While our **Technological Transformation** pathway utilises hydrogen as a clean fuel in a like-for-like replacement of natural gas boilers, the electrification of heat using heat pumps will improve overall system efficiency and utilisation. Not only does electrification of heat make decarbonisation easier to integrate with wind and solar generation, heat pumps can operate at up to 400% efficiency, drastically reducing the total energy required for the same heat provision. However, demand for domestic heating is correlated with existing peak electricity demand (between 4 and 7pm), and the large-scale deployment of heat pumps will have significant implications for the electricity network and should be considered alongside heat storage solutions, building energy efficiency, smart technologies and user flexibility. Energy Superhub Oxford is conducting a trial using smart controls and ground-source heat pumps across 60 social housing properties in Blackbird Leys.

148 HM Government (2020), Energy White Paper 2020.

149 SSEN Distribution Future Energy Scenarios (2021).

## Case Study: Green Ammonia Demonstrator

**Partners: University of Oxford and Cardiff, Siemens, Engie, and the Science & Technology Facilities Council (STFC)**

**The Green Ammonia Demonstrator brings together, on a single site, the technologies required to demonstrate the complete ammonia energy cycle (renewable power, storage and conversion back to electricity). The project will help understand the potential of ammonia for the rapid deployment of a bulk, carbon-free hydrogen network.**

**Based at the Rutherford Appleton Laboratory, the system uses electrolysis to produce hydrogen and extracts nitrogen from the air. The system combines these two elements in the Haber-Bosch process to make ammonia which can be used to store energy. When burned to produce electricity, ammonia releases no greenhouse gases.**

**Heat pumps** will be most suitable for areas with a robust electricity supply (urban centres), existing buildings using electric heating (flats and off-gas areas), properties with sufficient space (for ground source heat pumps) and well insulated homes. Geologically, there are some challenges to the deployment of ground-source technology in Oxfordshire due to the type of soil and a shallow artesian aquifer which limits deep boreholes.[150] In the case of the Energy Superhub trial, this has required additional drilling and associated cost. SSEN's DFES 2020 modelling suggests by 2050, for the high societal change scenarios, over 80% of all heat pump installations are domestic, with 70% of all domestic properties heated by a heat pump (20% direct electric).[151] Based on the DFES figures, with a correction for network – administrative boundary mismatch and more ambitious housing growth, zero carbon pathways require an estimated 64,000 to 134,000 heat pumps installed in Oxfordshire by 2030, increasing to between 250,000 and 390,00 by 2050 (Figure 8.6 (a)). The dashed line shows the annual rate of heat pump installations for the **Societal Transformation** scenario peaking at just over 17,000 around 2030, this is in line with national targets of 600,000 per year by 2028.

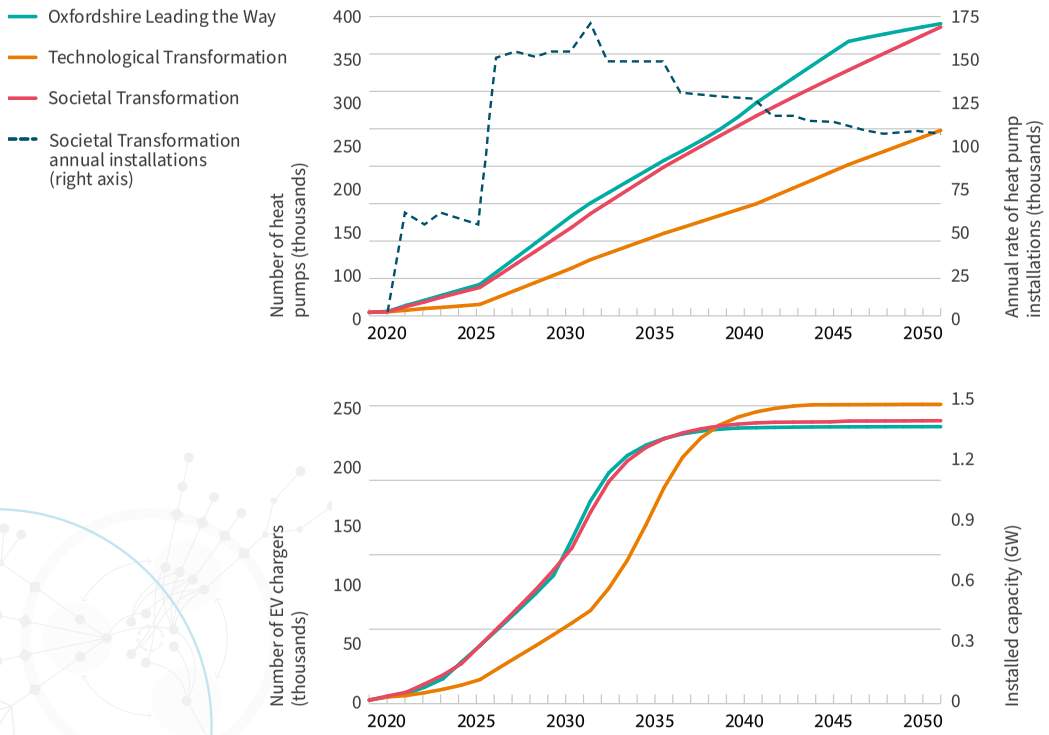
150 British Geological Survey, Principal aquifers in England and Wales.

151 This analysis was undertaken under the previous 80% $CO_2$ reduction targets and is being updated to match NGESO's FES 2020 scenarios. It also only includes SSEN's Oxfordshire network which excludes some parts of West Oxfordshire and Cherwell to the north.

Figures presented in the Transport chapter predict between 130,000 and 370,000 **battery electric vehicles** (EVs) in Oxfordshire by 2030, depending on scenario, increasing to between 450,000 and 600,000 by 2050. Assuming average annual mileage of 8,000 miles and average consumption of 0.22 kWh/mile, this equates to electricity demand of between 792 and 1,056 GWh/year. All scenarios suggest some transport will be hydrogen based, particularly HGV, with estimates of demand in Oxfordshire in the range of 400 GWh to 700 GWh for between 9,000 and 28,000 hydrogen vehicles. The relatively high demand per vehicle reflects the lower efficiency of heavier vehicles.

Figure 8.6(b) shows the number of EV chargers as estimated by the DFES. Across all technology types (off-street, on-street, workplace, carpark, destination, en-route and fleet), installed chargers are expected to total between 87,000 and 148,000 by 2030, rising to between 186,000 and 218,000 by 2050; 87% of these are off-street with 5% of both on-street and workplace chargers. Across all pathways, this could see between 1.3 and 1.6 GW of charge point capacity installed on SSEN's Oxfordshire network by 2050.

**Figure 8.6: Top – the number of heat pumps, and bottom – the number and estimated connected capacity of EV chargers installed in Oxfordshire based on DFES trends, but adjusted for anticipated housing growth**




## 8.3.2 Flexibility and storage

Storage will be needed throughout the energy system to manage both spatial and temporal (intraday and seasonal) differences in energy supply and demand, while flexibility is needed to support the networks during times of peak power flow. Both become more critical for security of supply as the penetration of variable renewable generation increases on the grid, while the location (transmission or distribution connected) will depend on how distributed the new energy technologies are. Thankfully, technologies already discussed as putting additional strain on the electricity system through increased demand (heat pumps and EVs), may also be able to offer flexibility as a secondary service at least on a diurnal basis.

**Batteries** offer both electrical storage and flexibility services. They are typically installed with one of four primary purposes: (1) as large standalone installations offering national network services (balancing market), (2) co-located with generation providing the site with price arbitrage opportunities (selling the generation at times of higher prices), (3) commercial behind-the-meter to balance load and avoid periods of high network charges (DUOS and TUOS) or (4) domestic batteries to improve self-consumption of rooftop PV. As markets for flexibility mature and become more accessible, stacking the various revenue streams will become an important part of a batteries business case.

The most likely opportunity for significant electrical storage within Oxfordshire will be co-location with the large solar capacity discussed above; many solar planning applications and grid connection requests include the potential for batteries to be added. However, the lack of long-term bankable revenue, tariff uncertainly (ongoing Targeted Charging and Forward-Looking Charges Review) and high technology costs mean batteries are rarely an investable proposition without subsidy at present. Recent modelling of battery storage with rooftop solar PV at Rose Hill Primary School found a gross marginal revenue of less than £150/year, representing a payback greater than 300 years.[152] To make the technology economical, unit costs must continue to fall while additional flexibility-based revenue opportunities need to be accessible and deliver value across the system. Oxfordshire forecasts based on NGFES baseline trajectories for battery electrical storage (corrected for the higher growth rates assumed here) suggest between 80 – 170 MWe of battery capacity will be installed by 2030 increasing to between 220 – 500 MWe by 2050 depending on pathway. There are currently three large battery applications in Oxfordshire which have been granted planning permission in the Renewable Energy Planning Database totalling 88 MWe. This includes the 50 MWe stand-alone ESO battery and two other solar co-located batteries.

152 Low Carbon Hub (2021), Plug-in Projects – Year 1 Review.

## Case Study: Brill Power

**Brill Power is an innovative battery technology company spun out from the University of Oxford with expertise in power electronics, battery modelling and control.**

- **Increased lithium-ion battery pack charge rates, reliability and lifetime**
- **Enables 2nd life battery applications**

**Brill Power's aim is to enable batteries to reach their full potential, avoiding the unnecessary battery waste that is seen in current systems. With funding from Oxford Sciences Innovtion and other VC investors, the company's game-changing intelligent Battery Management Systems (BMS) technologies increase the lifetime and reliability of lithium-ion battery packs for stationary energy storage and electric vehicles, whilst also delivering safety and sustainability benefits.**

**The Brill Power BMS offers up to 60% longer battery lifetime, lower lifetime cost, improved safety, faster charge rates and enables 2nd life battery applications.**

**EVs** offer a secondary use, beyond just transport, in supporting the grid through flexibility services in the form of **smart charging** or **vehicle-to-grid** (V2G). National Grid predict over 50% of households will use smart charging by 2050. This could see residential EV peak demand in Oxfordshire limited to around 50 MW, compared to almost 200 MW without smart charging (in the high societal change scenario). There is much more uncertainty with V2G utilisation. Our **societal transformation** scenario estimates that 26% of households will make vehicles available for V2G by 2050, meaning that Oxfordshire could benefit from between 1.6 GWh and 3.5 GWh of storage capacity with peak power generation of between 110 MW and 245 MW.

## 8.4 Enabling the transition – networks

### 8.4.1 Electricity

Oxfordshire is supplied by multiple electricity distribution network areas; the majority of the county is supplied by Scottish and Southern Electricity Networks (SSEN), around 87% by area, while the very north of the county, including Banbury, is supplied by Western Power Distribution (WPD) and a small area to the east around Thame is supplied by UKPN. The transition to net-zero will undoubtably have a significant impact on electricity networks in terms of their physical capacity to deliver power and energy, how they are managed and how end users actively engage.

As demand and variable generation increases, bidirectional peaks in power flow could become more extreme without smart network management. The smart grid could also create opportunities for new market models based on peer-to-peer energy trading and energy-as-a-service, integrated with other sectors such as mobility and heat. These changes will be spatially correlated with human and physical geography which requires specific local solutions.

On SSEN's Oxfordshire network, 35% of primary substations are currently labelled as constrained to additional contracted demand, while 61% are labelled as constrained for additional generation (greater than 5 MVA synchronous) due to either downstream (lower voltage) or upstream (higher voltage) constraints.[153]

As smart energy-using devices proliferate, there is greater potential to manage the distribution grid. This potential flexibility enables existing infrastructure to be optimised and costly network reinforcement to be avoided. Recent work undertaken on behalf of Piclo found flexibility could reduce whole system costs by £4.55bn per annum nationally compared with a passive approach, and RIIO-ED2 (Ofgem's next price control process for regulating DNO revenue and spend, covering the period from 2023–2028) will play a crucial role in enabling the smart grid.[154] However, this requires network companies to have a much closer relationship with their network users, communities and local policy makers to ensure coordinated solutions. SSEN's TRANSITION project selected Oxfordshire to develop, demonstrate and assess the tools, data and system architecture required for the smart grid because of the county's appetite for energy innovation and suitability for assessing wider replicability.

153 SSEN (08/03/2021), Generation and Demand Availability Maps. It should be noted that this data only provides an indication of network capability and changes regularly based on the current pipeline of network upgrades and live connection requests.

154 Piclo (2020), Modelling the GB Flexibility Market.

### 8.4.2 Heat

There are examples of private and commercial district heat networks within Oxfordshire include the 890 kWe gas CHP at NW Bicester Eco Town, a private 1MW biomass heat network on the Ditchley Estate, University of Oxford's Science Area, and the 4.5 MWe gas CHP installed between the John Radcliffe and Churchill Hospitals. While heat networks offer advantages from reduced plant maintenance, the high cost of installation, emission concerns relating to gas CHP, and uncertainty around hydrogen replacement mean they are often unattractive in the short term. District heat networks which make use of waste heat could be more favourable. However, depending on transmission distance and timeframe for demand (including land ownership, physical obstacles and phased housing buildout) installation costs can be prohibitive. In Oxfordshire, there is potential for building waste heat networks at the science parks, data centres, AD sites, refrigeration such as in supermarkets or the previously mentioned Ardley ERF. Oxford City Council has been awarded a £10.9m grant to help transform heating in some of their highest consuming buildings. This includes £1.6m for a water source heat network to heat Hinksey outdoor swimming pool, one of the largest in the south of England.

### 8.4.3 Digital

The transition to a smart, local, net-zero energy system will be enabled by digitalisation of the assets and networks which are needed deliver it. Reliable and accessible communications and data platforms will be essential for providing the information required by each participant to effectively operate. Households will become Smart Homes as appliances such as washing machines, dishwashers, EV chargers and heat pumps utilise Internet of Things (IoT) technology to deliver the desired service while coordinating with the wider system. Oxfordshire's technology research environment and population of early adopters makes it an ideal place to foster this innovation.

Access and interoperability of energy data is fundamental in unlocking system and user benefits of the future smart grid. It will be key to the emergence of new business models, development of new assets and system operation. Across the universities and research centres, Oxfordshire has a wealth of experience working with data including its use within research but also its storage and management. STFC Rutherford Appleton Laboratory and Harwell Campus is host to JASMIN, a 'super-data-cluster', DAFNI (Data & Analytics Facility for National Infrastructure) and UKERC's Energy Data Centre, an archive of UK publicly funded energy research data.

Historically, monitoring of the low voltage distribution networks has not been a requirement for system operation, but as this changes, installation of monitoring kit on the distribution network is progressing quickly though SSEN's Project LEO and NeRDA (Near Real-time Data Access), while WPD provides access to its data through their System and Network Data Hub. To gain the full potential of energy data, it needs to be analysed in combination with a vast array of other data sets such as land use and socio-economic data and then disseminated in a transparent and accessible way.

This type of analysis underlies much of the DFES work being undertaken by DNOs at present, while Oxfordshire County Council are working on a GIS platform to make these linked spatial and temporal datasets easily accessible to a wider audience.

### 8.4.4 People

While the range of technical outcomes of Oxfordshire's energy transition have been presented above, the exact route and speed of transition will come down to people: as active users, influencers, and builders of the future energy system. To maximise user engagement and developer coordination, creating and fostering networks of people will be crucial for delivering net-zero. There are many great examples of this already happening within Oxfordshire.

Oxfordshire's strong community action group scene will be invaluable for engaging with users at a community level. As part of Project LEO, the Low Carbon Hub are working directly with local communities to develop Smart and Fair Neighbourhood (SFN) trials which aim to test the social innovation (alongside both technical and financial) required to get approval and mass participation in new equitable energy services at the most local level.[155] The Low Carbon Hub's Peoples Power Station is another great example of ways in which end users are being encouraged to take an active role in the energy system.

Delivering the energy system for 2050 is also reliant on having the supply chains and skilled workforce available to manufacture and install the required infrastructure. Look no further than the recent challenges faced with the Green Homes Grant where homeowners have been unable to access the scheme because of a shortage of qualified contractors. This has also been the experience of Cosy Homes Oxfordshire, a local whole house retrofit service. This can only be fixed through the encouragement of new people entering the sustainable energy building sector and supply chain through training and apprenticeship programmes.

155 The Low Carbon Hub (2021), Developing an ethical framework for local energy approaches.

# 9 Land use and sequestration

Chapter author: Alison Smith

Photo: Kristine Cinate on Unsplash

## 9.1 Introduction

Land use has a crucial part to play in reaching net-zero. Vast amounts of carbon are stored in soils and vegetation globally, and land can be either a source or a sink of greenhouse gas emissions depending on how it is managed. Nevertheless, although protecting the carbon stored in existing ecosystems and reducing land use emissions is critical, the potential for land to absorb additional carbon dioxide is limited by the finite land area and competition with food, fuel and fibre production. In addition, ecosystem stress caused by future climate change risks changing many land and water-based sinks into emission sources. The primary goal of climate action must therefore be steep reductions in fossil fuel use, but well designed 'nature-based solutions' can also contribute to both climate mitigation and adaptation, as well as providing wider benefits for biodiversity and human health and well-being.[156]

It is essential to design land use policies to optimise these wider benefits, and also to manage and minimise the inevitable trade-offs. In particular, it is increasingly urgent to co-ordinate land use strategies to address both the climate and ecological crises, which are closely linked. A hard-hitting report by IPBES warned that human activities are putting up to one million plant and animal species at risk of extinction.[157] This message is echoed by the State of Nature reports for England[158] and Oxfordshire,[159] which reveal continued declines in abundance and diversity of many animal and plant species, due to habitat loss and fragmentation, pollution, and climate change.

To address this, the 25 Year Environment Plan for England requires local authorities in England to develop Nature Recovery Strategies. Local councils and wildlife groups are working together to set up a Local Nature Partnership, which brings together key stakeholders in the land use and biodiversity sector. Wild Oxfordshire, the Berks, Bucks and Oxfordshire Wildlife Trust (BBOWT) and the Thames Valley Environmental Records Centre (TVERC) have already worked with stakeholders to produce a map of a draft Nature Recovery Network, which targets habitat restoration in zones that connect existing high value habitats.[160] This was overseen by Oxfordshire's Biodiversity Advisory Group (BAG) and adopted by the Oxfordshire Environment Board (OxEB).

156 Seddon, Smith et al 2021. Getting the message right on nature-based solutions to climate change.

157 IPBES (2019), Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services.

158 Hayhow et al. (2019), The state of nature 2019. The State of Nature partnership.

159 Wild Oxfordshire (2017), The state of nature in Oxfordshire, 2017.

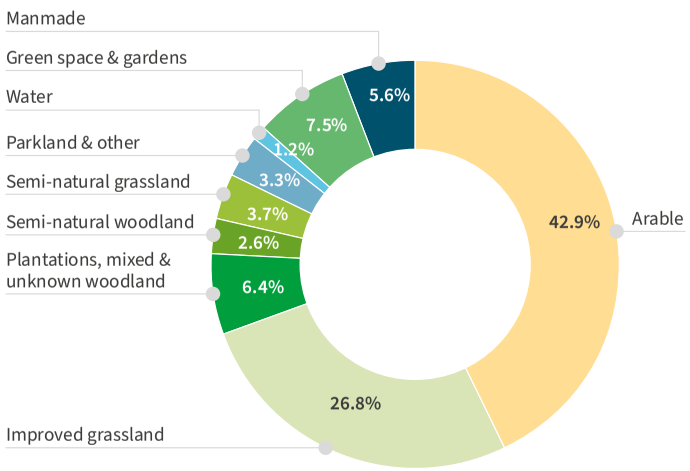
160 Wild Oxfordshire, Draft map of Oxfordshire's nature recovery network.

In this chapter we address the role and impact of land use, land use change and forestry (LULUCF) on Oxfordshire's net-zero ambitions, in terms of carbon emissions, storage and sequestration. Within the scope of this project it was not possible to model agricultural emissions of $CO_2$, methane and nitrous oxide), but as these comprise 10% of total UK GHG emissions[161] (and the food system as a whole is responsible for around 30% of all emissions) this is a critical area for further research.

## 9.2 Current land use in Oxfordshire

Land use analysis is based on the Natural Capital map of Oxfordshire.[162] Full details of the methodology and tables of data and assumptions for each scenario are in Annex 1.

**Figure 9.1: Habitat areas in Oxfordshire**




Oxfordshire is dominated by intensive agriculture (Figure 9.1). Farmland occupies 70% of the county: 43% arable and 27% improved grassland (fertilised pasture). There is only 9% woodland, well below the UK average of 13% and slightly less than the English average of 10%, and most of this is plantation rather than semi-natural[163] woodland. Almost 6% is sealed surfaces (buildings, roads, car parks etc) and a further 7.5% is domestic gardens and other forms of urban green space such as playing fields and allotments. Only 7% is semi-natural habitats other than woodland: this is mainly semi-natural grassland such as floodplain meadows and chalk grassland, and parkland with scattered trees, with very small areas of wetland, scrub and heath. However, there are around 17,000 km of hedgerows and lines of trees along field boundaries in Oxfordshire, plus an unknown number of individual street trees and field trees, which also store and sequester significant amounts of carbon.

The map in Figure 9.2 shows the predominance of arable land (yellow) and improved grassland (pale green). Small patches of semi-natural grassland (bright green) exist in places, and the dark green shows the woodlands of the Chilterns in the south-west, as well as isolated woodlands elsewhere.

161 Defra (2020), Agricultural Statistics and Climate Change.

162 Smith (2019), Natural capital mapping in Oxfordshire – Short report.

163 Note: the term 'semi-natural' is used because very few habitats in the UK can be describes as 'natural' due to a long history of human management of the landscape.

**Figure 9.2:** Map of habitats and land use in Oxfordshire

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This map incorporates biodiversity data provided by the Thames Valley Environmental Records Centre (TVERC) which is copyright to TVERC and its partners.

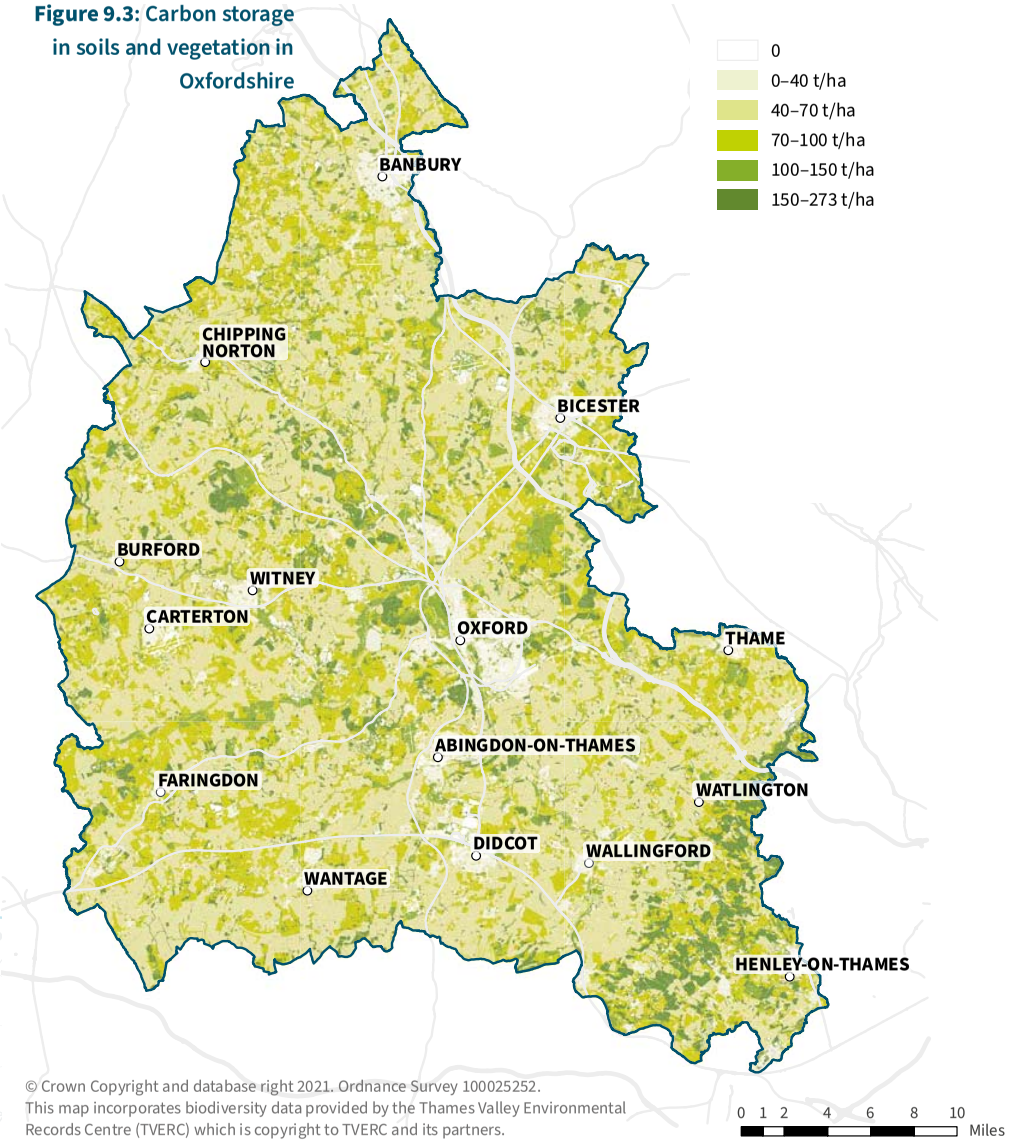
## 9.3 Estimate of current carbon storage and sequestration

Carbon storage and sequestration was calculated using the areas of each type of habitat multiplied by estimates of carbon stored or sequestered per hectare. For non-woodland habitats we used a range of literature sources. For woodland, we calculated average sequestration rates in different types of Oxfordshire woodland using the Woodland Carbon Code Calculator.[164] We used the Forestry Commission's ecological site classification tool[165] to work out what types of woodland are suitable for Oxfordshire's soil types and climate (warm dry, or warm moist on higher land), and what the range of yield classes (productivity) would be in different soils. For example, only Beech is considered suitable for carbonate soils, but a wider range of species can grow elsewhere. We then assumed average compositions and management regimes for different woodland types, for example we assumed that broadleaved plantations were composed of an average of 80% Beech and 20% Oak, managed with regular thinning and planted at 2.5m spacing. Full details of the methodology and assumptions are in Annex 1.

164 www.woodlandcarboncode.org.uk

165 Forest Research, Ecological Site Classification Decision Support System.

**Figure 9.3:** Carbon storage in soils and vegetation in Oxfordshire

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This map incorporates biodiversity data provided by the Thames Valley Environmental Records Centre (TVERC) which is copyright to TVERC and its partners.

For semi-natural woodlands we assume that the woodlands are currently 100 years old, so we take the average sequestration rate from ages 100 to 130 years to estimate sequestration from 2020 to 2050. For plantations we take average sequestration rates over 60 years (the typical rotation length), and then subtract the amount lost due to decay of harvested wood products, which we assume to be 50% (i.e. we assume that 50% of all harvested wood is currently locked up in timber construction or other long lived products, with the rest used for short-lived products such as paper, cheap furniture or fuel combustion).

These figures should be treated as a scoping estimate because metrics of carbon storage and sequestration in ecosystems are highly dependent on a range of factors including soil type, soil depth, soil density, soil and vegetation condition, habitat age, tree species, climate, and management. Even if all these parameters are known, data on how carbon storage and sequestration varies with all these factors is patchy and different sources are not in good agreement.

Figure 9.3 maps the carbon storage across Oxfordshire. The woodland areas stand out, and the higher score for grassland compared to arable land can also be seen.

Arable land is a source of emissions due to carbon loss as soils are disturbed during cultivation. This loss is estimated at 0.25 tC/ha/y, or 28,000 tC/y, responsible for an estimated 837,000 tC between 2020 and 2050. It is offset by sequestration, primarily by woodlands and hedgerows[166] (109,000 tC/y) but also by grasslands and other semi-natural habitats, with a small contribution from urban green spaces. As noted above, these estimates are highly uncertain. Individual trees such as street trees and field trees are not included in these estimates due to lack of affordable data. The full breakdown of emission estimates is given in Annex 1.

It is estimated that around 23 Mt of carbon is stored in Oxfordshire's soils and vegetation, and an additional 115,000 tonnes is sequestered each year, so that around 3.5 Mt C would be sequestered between 2020 and 2050 if there was no further land use change. However, the carbon stored in soil and vegetation is lost when land is cleared and topsoil removed for new developments of housing and infrastructure. Analysis of land use change from 2014 and 2020 using OS Mastermap shows that 2,710 ha of agricultural land and other natural surfaces were converted to sealed surfaces and buildings. Even if all the land converted was arable, with a relatively low carbon content of 66 tC/ha, this would equate to a loss of 178,880 tonnes of carbon, equivalent to 29,813 tonnes per year, which reduces the net annual sequestration to 85,000 tC/y, or 312,000 t $CO_2$/y.

### Sequestration calculation methodologies

The figures for Oxfordshire produced by BEIS (see Chapter 3, Figure 3.1) indicate annual sequestration of 26,700 t C, or 98,000 t $CO_2$. This represents only 31% of our estimate, but with a rising trend over time. BEIS produce their regional figures by scaling-down national land use datasets, and by extrapolating from trends in land use change prior to 2007. Our land use figures are based on the detailed natural capital map of Oxfordshire, which is more accurate, and based on more recent data than the BEIS figures. However the main difference arises because we assume continued sequestration of carbon by all woodlands, in line with the figures calculated from the Woodland Carbon Code as described above, whereas BEIS assume that all woodlands older than 100 years have reached an equilibrium and no longer sequester carbon. We also take account of carbon sequestration by hedgerows and lines of trees, gardens, and urban green spaces, which are ignored in the BEIS estimates.

166 Hedgerows and lines of trees come from an experimental dataset provided for research purposes only by Ordnance Survey, and this data should be treated with caution. We have assumed a width of 2.5m for hedgerows and 6m for lines of trees, and subtracted this area from the areas of arable and improved grassland (half and half).

## 9.4 Opportunities to enhance carbon storage and sequestration.

A range of options could be considered to protect and enhance carbon storage and sequestration in ecosystems. Protecting the carbon stored in soil, which far exceeds that stored in vegetation (even for woodlands), is particularly important. However, as land use change involves trade-offs with other uses, any major initiatives must involve extensive consultations and should be planned in partnership with landowners and other stakeholders. Potential options include:

- **Increasing tree, shrub and hedgerow cover**. New trees can be planted, or areas can be left to regenerate naturally if there is a seedbank in the soil or woodland nearby. Natural regeneration will avoid the initial loss of carbon that occurs when soil is disturbed during tree planting, though the sequestration rate may be slower at first as it takes longer for trees to establish.
- **Restoring other habitats**. Semi-natural grasslands, shrub, heath and wetlands can store large amounts of carbon in soils. Ponds and waterbodies also sequester carbon in their sediments, as well as being relatively quick and easy to create. Rewilding an area through natural regeneration can lead to a diverse mix of habitats with significant biodiversity benefits.
- **Sustainable agricultural management** can reduce emissions and enhance soil carbon, such as through use of cover crops, no-till agriculture and/or organic farming methods.
- **Bioenergy crops**. Short rotation coppice or *Miscanthus* grass can be grown for bioenergy, although the net carbon benefit depends on the life cycle emissions after energy use for planting, fertilising, harvesting and processing is taken into account.
- **Urban green infrastructure** such as green walls, green roofs, parks, street trees and sustainable drainage systems can store carbon while providing a range of other benefits such as stormwater management and urban cooling.[167]

Photo: Dmitry Grigoriev on Unsplash

167 Schüder, I (2020), Making the case for investing in Green Infrastructure in Oxfordshire. A report commissioned by Oxfordshire County Council.

### 9.4.1 Making space for sequestration

Creating woodland or other semi-natural habitats, growing bioenergy crops or installing solar panels will involve loss of farmland. This is turn could simply displace emissions, because land elsewhere, either in the UK or overseas, could be converted to farmland to replace the lost food production. In fact, this could even lead to an increase in emissions if production shifts to less productive land, or if high carbon habitats such as tropical forests are converted to farmland as a result. There are various options for avoiding or reducing this emission 'leakage' and freeing up space for carbon sequestration:

- **Avoiding loss of high grade farmland** (grades 1, 2 or 3a) will reduce the impact of land-use change.
- **Dietary change**. Half of all wheat production and two thirds of all barley production in the UK is for animal feed,[168] so cutting meat and dairy consumption will significantly reduce the area needed for both cropland and grazing land. It will also reduce direct GHG emissions of methane from enteric fermentation in the guts of cattle and sheep and nitrous oxide from manure production and fertiliser use, thus reducing the need for other land-using emission reduction options such as biofuel production for BECCS.
- **Reducing food waste**. Similarly, reducing the estimated 14% of food that is currently wasted in UK households and the additional amount wasted in the supply chain will reduce both the area of land needed to produce food and also the direct emissions from producing, transporting, storing and disposing of wasted food.
- **Increasing agricultural productivity** can reduce land requirements, but this may also increase emissions and environmental impacts such as water and air pollution if it involves additional fertiliser use or mechanisation.
- **Agroforestry** (trees in pasture or among crops), hedgerow trees, street trees and trees in residential gardens can all add trees to landscapes without reducing agricultural production.
- **Reducing the land lost for new urban development**, including by increasing housing density (e.g. more mid-rise buildings and flats), making use of brownfield sites, building close to existing rail stations and other public transport hubs to remove the need for new roads, encouraging active travel and car sharing to reduce need for car park space, building compact mixed developments, and focusing on meeting the local need for affordable housing rather than large investment properties.

Photo: Steph Ferguson

168 Defra (2020), Agriculture in the UK Statistics, Tables 7.2 and 7.3.

## 9.5 Scenario definitions

Here we describe in more detail how we have applied the four scenarios presented in Chapter 4 to the land use sector.

### 9.5.1 Development and green infrastructure

As described above, urban development on greenfield sites involves direct loss of carbon as topsoil is removed and vegetation cleared, and also reduces the land available for future carbon sequestration or renewable energy options, as well as potentially displacing food production and associated emissions elsewhere. Reducing the footprint of new developments is therefore critical to enable land use to contribute to emission reduction. However, there is a trade-off between increasing the dwelling density and building in essential green infrastructure to provide health and wellbeing benefits, green travel routes and habitat for wildlife.

It is also vital to protect existing habitats within new developments. For example, the plans for North-West Bicester Eco-town were designed to preserve existing hedgerows, woodlands and streams, building them into an attractive active travel network of footpaths and cyclepaths.

We assume that in the **Societal Transformation** and **Oxfordshire Leading the Way** scenarios, strong planning policies such as supplementary planning guidance are used to insist on sustainable, compact mixed developments with high quality walking and cycling infrastructure. Local plans allocate land for development that is close to existing or new rail stations and bus routes. Education and awareness campaigns encourage a shift to active travel, car sharing and public transport use that enables car ownership to be reduced to one car or less per household, thus reducing the area required for car parking.

Although all dwellings have some private outdoor space, there is less emphasis on large private gardens and greater provision of shared green spaces including wooded areas and sustainable drainage systems such as raingardens and retention ponds. All newly built flats, schools and commercial buildings feature green roofs on half of the roof area, with green roofs covering 14% of total rooftop area across the county by 2050. All semi-natural habitats are protected from development and any existing hedgerows and trees are incorporated into the design as green infrastructure features. Together with greater use of mid-rise (3 and 4 storey) dwellings and flats, and a focus on delivering affordable housing, this increases typical housing density to 60 dwellings per hectare (d/ha).

In contrast, the **Steady Progression** scenario remains at the current average density of around 20 d/ha, and the **Technological Transformation** scenario shows some improvement but only achieves a density of 30 d/ha; both these scenarios fail to protect existing habitat features and therefore more carbon is lost due to site clearance.

### 9.5.2 Food production

With current diets, there is only enough farmland in the county to produce the equivalent of 74% of our food requirements[169] (see Annex 1 for methodology). This would decrease to 41% by 2050 as the population grows from 650,000 to 1,000,000, driven by construction of new housing. This means that Oxfordshire imports a significant level of 'embodied emissions' in the food that is produced elsewhere.[170]

169 Winney (2020), Land-use trade-offs between a proposed Nature Recovery Network, housing and food production in Oxfordshire. MSc dissertation, Environmental Change Institute, University of Oxford. Based on extrapolation of the analysis for Oxford City using relative populations. Low Carbon Oxford (2016) FoodPrinting Oxford: How to feed a city.

170 Low Carbon Oxford (2016), FoodPrinting Oxford: How to feed a city.

Under **Societal Transformation** and **Oxfordshire Leading the Way**, we assume that there is a successful campaign to persuade people to eat 75% less meat. This is in line with the Livewell diet advocated by the World Wide Fund for Nature, which in turn is derived from a low-carbon version of the Eatwell Plate recommended by Public Health England for a healthy balanced diet.[171] This could free up 34,000 ha of farmland (13% of the current farmland area) for other uses while also allowing Oxfordshire to effectively meet the equivalent (in terms of calories) of 100% of its own needs for food production at present, although this would fall back down to 74% by 2050 due to population growth.

Under the **Technological Transformation** scenario, there is no dietary change but there is a focus on increased productivity in farming. This includes use of gene editing and GMO techniques, more use of artificial intelligence for precision agriculture, and more indoor cultivation for horticulture such as vertical farming and hydroponics (although horticulture uses a very small proportion of farmland). In the CCC scenarios,[172] there is an assumption that crop productivity increases by 39% (Medium ambition) or 65% (High ambition), though this is acknowledged to be very ambitious as yield increases for the main UK cereal crops have stalled in recent decades.[173] In our scenario we assume that crop productivity increases by 39%, in line with the CCC Medium Ambition scenario, and that livestock productivity increases by 10% due to improvements in animal health. For **Steady Progression** we assume an increase of 10% for crops, in line with recent trends, and no increase for livestock. For the other two pathways we assume an intermediate increase of 20% for crops and 5% for livestock.

Although conventional arable cultivation results in a large loss of soil carbon due to erosion and oxidation when soils are ploughed, there is a significant potential for reversing this loss through 'regenerative agriculture' techniques. These include low or no-till agriculture, use of cover crops to prevent soil erosion, adding manure or compost to the soil, reduction of over-grazing, and use of a more diverse mix of plant species in pastures. For example, arable soil carbon levels at East Hendred Farm have doubled from approximately 3% to 6% over ten years. A recent study showed that these techniques can increase soil carbon by around 18%.[174] Although it is likely that soil carbon will eventually saturate, the large area of farmland means that even an increase of a few percent in soil carbon could be significant if widely replicated across the county. In Oxfordshire, FarmEd[175] are leading a drive to raise awareness of regenerative agriculture, and Tolhurst Organics (see case study) have shown how carbon-negative farming is possible even without the use of animal manure.

We assume that under **Steady Progression** and **Technological Transformation**, regenerative agriculture remains a niche activity, growing to cover only 1% of farmland by 2050. Under **Societal Transformation** and **Oxfordshire Leading the Way**, we assume that there is widespread uptake of these techniques, reaching 50% of all farmland by 2030 and 80% by 2050, with consequent benefits for carbon sequestration as well as biodiversity and soil erosion.

171 WWF (2017), Livewell diet revised report.

172 CCC (2018), Land use: Reducing emissions and preparing for climate change.

173 For example the five year average wheat yield has increased by 6% since 2000, from 7.8 to 8.4 t/ha. From analysis of Defra (2020), Agriculture in the UK, Table 7.2.

174 Crystal-Ornelas et al (2021), Soil organic carbon is affected by organic amendments, conservation tillage and cover cropping in organic farming systems: a meta-analysis.

175 FarmEd, What is regenerative agriculture?

## Case study: Tolhurst Organics

Tolhurst Organics lies just outside the village of Whitchurch-on-Thames in south Oxfordshire. It is one of the UK's longest established organic vegetable growing business, with a 7 ha field and a 1ha walled garden. The main income source is a veg box scheme supplying families in Reading and Oxford.

Environmental awareness is at the core of the business, with the aim of supplying vegetables to customers with the lowest possible carbon footprint. In 2012, a study by University of Surrey found that total emissions of the farm came to 16.6 t/$CO_2$e per year, less than the total sequestration of 21t of $CO_2$e per year, meaning the whole farm was 'carbon positive' by over 4t $CO_2$e per year.

With no animals on site, the farm has managed to continually build organic matter levels without the use of external inputs. This is achieved through use of green manures and a tillage policy of shallow and timely cultivations. Additional sequestration is provided by creating habitat for wildlife. Hedgerows are allowed to grow wide, accounting for 17% of total sequestration; a small woodland area and a willow coppice account for over 24% of sequestration, and 9% is from field margins.

### 9.5.3 Solar power

In the **Societal Transformation** (ST) and **Oxfordshire Leading the Way** (OLW) scenarios we assume that efforts are made to reduce the displacement of food production by integrating solar power with agriculture, using the 'ag-electric' techniques described in Chapter 8, for half of the area of solar farms, split equally between arable and grazing land. There is also more support for rooftop solar, with 25% of solar capacity installation being on rooftops in ST and 30% in OLW. Solar panels cover 9% of the total rooftop area in ST, and a very ambitious 20% in OLW, by 2050.

In **Technological Transformation**, there is a less strategic approach to land use and the focus is more on energy technology, so solar farms are not shared with food production. Only 10% of solar capacity is installed on roofs. This effectively displaces food production out of the county, causing displaced emissions as land elsewhere is converted for agricultural use.

### 9.5.4 Planting trees and restoring other habitats

Ongoing work to create an Oxfordshire Tree Opportunity Map considers opportunities for different types of woodland, agroforestry, hedgerows and street trees. The goal is to double tree cover in Oxfordshire from the current 9% (23,000 ha) to 18%, which is consistent with the High Ambition scenario in the CCC land use and climate report. We have built on the methodology being used to create the Tree Opportunity Map for our scenario assumptions (see Annex 1).

Under **Steady Progression**, we assume a modest rate of new woodland planting of 60 ha per year, driven by continued agri-environment and biodiversity net gain funding. This is consistent with the National Forest Inventory, which records a 72 ha increase per year from 2014 to 2018, some of which could be due to improved accuracy of the inventory. Restoration of other habitats is limited to 5 ha per year of semi-natural grassland.

Under **Societal Transformation** and **Oxfordshire Leading the Way**, we assume that dietary change frees up large amounts of farmland for tree planting and habitat restoration, enabling tree cover to be doubled. With farmers, local authorities and residents all committed to this goal, this is achieved not just through planting woodlands on farmland but also through agroforestry, new hedgerows (half of field boundaries currently have hedgerows; we assume this increases to 75%), and new trees in urban parks and amenity green space (such as round the outside of playing fields) and residential gardens.

In line with the Tree Opportunity Map guidance,[176] there is a strong emphasis on planting the right trees in the right place, avoiding high grade farmland in order to minimise loss of food production. Biodiversity co-benefits are maximised by favouring a diverse mix of native broadleaves such as beech, oak and native shrubs, and not planting trees on priority habitats such as semi-natural grassland.

A range of other carbon-rich habitats are also restored, doubling the area of shrub, heath, wetlands, chalk grassland, dry acid grassland and floodplain meadows from 4.5% to 9% (Table 9.3). This habitat restoration and native woodland planting will be primarily targeted within the Nature Recovery Network in order to help connect existing habitats.

Floodplain meadows are particularly important, as only 3% remain in England, with the rest being lost for intensive agriculture or development. Restoration, by reconnecting rivers with their floodplains and ceasing arable cultivation, can boost carbon sequestration, reduce soil loss and improve water quality. Some of the meadows in Oxfordshire are already being restored and there is good potential for further restoration (see Chimney Meadows case study).

In contrast, under **Technological Transformation**, there is less willingness to change behaviour (including diet), as society relies on technical solutions. This constrains the amount of land available for tree planting, and there is also reluctance from farmers, local authorities and residents to add agroforestry, hedgerows and urban trees. As a result, the target to double tree cover is not met, with only around 6,000 ha being added by 2050. The trees planted are mainly fast-growing non-native monocultures destined for harvested wood products including biofuel, so there are few benefits for biodiversity, and even a loss of biodiversity as, with a less strategic and co-ordinated approach to land use, some trees are planted on high-value habitats such as floodplains and high grade farmland. There is no further restoration of open habitats, because tree-planting is prioritised.

176 Oxfordshire Trees for the Future, Creating a tree opportunity map.

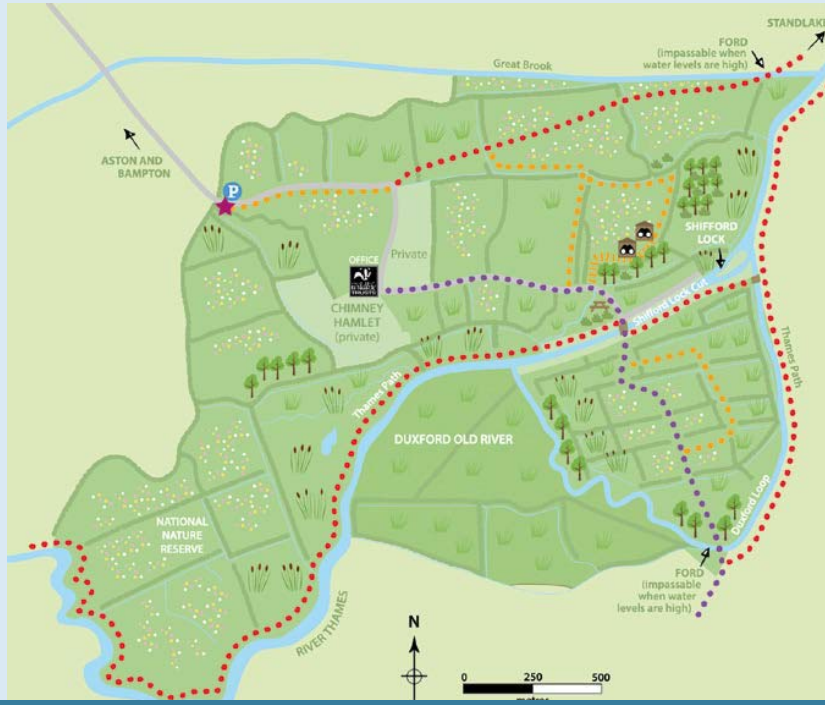
## Case study: Chimney Meadows Wetland Restoration Project

**Partners: Berks, Bucks & Oxon Wildlife Trust (BBOWT), Hydro International, and The European Agricultural Fund for Rural Development, Environment Agency, Oxfordshire County Council**

- Annual net mitigation of –484.59 t/$CO_2$e through carbon sequestration
- Planned creation of 'naturalised' bypass channel of ~550 m to create new wetland habitat and improve fish passage
- Plans to use ~46 ha of land around Duxford Ford for floodplain restoration

Chimney Meadows is a 308 ha nature reserve near Bampton, Oxfordshire. It is part of a chain of nationally important wetland habitats in an ancient floodplain landscape formed by the Thames and has been shaped by farming over centuries. Most of the reserve was intensive arable farmland prior to 2003, when BBOWT started to restore the area to a mosaic of floodplain meadows, wetlands, pasture and wet woodland. As part of these restoration efforts, it has been estimated that creation of 88 ha of species-rich meadow together with 6 ha of woodland, scrub and hedgerows would sequester an additional 484 t$CO_2$/year. Additional carbon benefits are expected from a new Wetland Restoration Project at Duxford Old River Land, which was added to the reserve in 2017.

The reserve provides other ecosystem services including flood protection, water quality regulation, health and recreation benefits and wild species diversity. Renaturalising the floodplain so that the land floods earlier and retains water longer will help to protect communities downstream from flooding, while the reedbeds and meadows will help filter out pollutants, improving water quality. The restored habitats provide huge benefits for biodiversity, including iconic species such as the Curlew and Water Vole, and there are plans for a new fish passage, a naturalised bypass channel of around 550 meters connected to the Thames through culverts. If planning permission is granted this work would begin in the Summer of 2021.



### 9.5.5 Bioenergy

The UK currently imports most of its bioenergy resources. For example only 11% of the feedstock for transport biofuels was produced in the UK in 2019.[177] Imports have grown from 11 TWh in 2008 to 40 TWh in 2017, driven by the Renewables Transport Fuel Obligation, the Renewable Heat Incentive (biomass boilers) and the Renewables Obligation (electricity generation).[178] Only 96,000 ha was used for bioenergy crops in the UK in 2019, 1.6% of the UK's arable land. This was mainly maize for anaerobic digestion, with smaller amounts of wheat and sugar beet for bioethanol, Miscanthus and short rotation coppice.[179]

All four scenarios depend on increasing use of bioenergy, as a transport fuel for HGVs, aviation and shipping; for biomass heating; and for BECCS as a negative emission technology. However, to produce the feedstocks locally would require between 37% and 56% of the land in Oxfordshire (see Annex 1), which would displace food production to other locations in the UK or overseas. We have therefore specified a much lower area of biofuel production in our scenarios, acknowledging that the remainder must be imported. Although the UK has set criteria for 'sustainable' biofuel production, producing such large quantities of biofuel feedstock will inevitably compete with land needed for food production or wildlife habitat overseas, leading to indirect impacts on GHG emissions and biodiversity.

For comparison, the Climate Change Committee's high ambition land use scenario assumes that 1.2 Mha is used for bioenergy crop cultivation in the UK, of which Oxfordshire's share (based on energy demand) would be around 17,000 ha. However this is only for Miscanthus, short rotation coppice and forestry, not transport biofuels which presumably will have to continue to be imported.

Additional energy demand reduction and deployment of renewable energy, going beyond the FES scenarios, could reduce the need for BECCS, thus reducing the need for bioenergy imports and associated impacts. For example, there is potential for further behaviour change such as switching off unused lights and appliances or changing social norms regarding thermal comfort (so that heating thermostats can be adjusted downwards). This would be consistent with an extended version of the ST and OLTW scenarios.

## 9.6 Scenario analysis

### 9.6.1 Carbon impacts

Table 9.1 shows the impact of the four scenarios on the carbon stored in soils and vegetation in Oxfordshire, as tonnes of carbon and the equivalent $CO_2$. Under **Steady Progression**, stored carbon decreases from 23 Mt in 2020 to 21.5 Mt carbon by 2050 as land is lost to development. However, the three net-zero pathways all enhance stored carbon as well as increasing the ability of ecosystems to sequester carbon in future years. **Societal Transformation** stores and sequesters the most carbon, with net sequestration reaching 19% of the current annual emissions by 2050. This is possible because farmland is freed up for tree-planting and habitat restoration due to dietary change, more compact developments reduce land take, and existing high-carbon habitats are protected from development.

177 Department for Transport (2020), Energy and Environment Data Tables ENV0502 Renewable fuels by country of source feedstock.

178 National Grid ESO (2020), Future Energy Scenarios July 2020. Interactive report, p61.

179 Defra (2020), Area of crops grown for bioenergy in England and the UK, 2008 to 2019 dataset.

**Oxfordshire Leading the Way** stores a little less carbon because more land is taken for biofuel production and ground-mounted solar installations. In **Technological Transformation**, some farmland is freed up through improved agricultural productivity but net sequestration is lower, at 11% of current annual emissions.

However, these estimates do not include the impact of emissions produced outside Oxfordshire from imports of food and biofuels (see next section). Although these 'Scope 3' emissions are outside the scope of this report, it is important to be aware of them.

**Table 9.1 Carbon stored and sequestered by soils and vegetation in the baseline (2020) and each scenario in 2050.**

| Carbon | Baseline | SP | ST | TT | OLTW |
|---|---|---|---|---|---|
| Carbon stored, Mt C | 22.9 | 21.1 | 27.5 | 23.8 | 25.1 |
| Carbon sequestered, kt C/y | 116 | 109 | 217 | 146 | 203 |
| Carbon loss due to development, kt C/y | –30 | –29 | –6 | –21 | –6 |
| Net carbon sequestration, kt C/y | 86 | 80 | 212 | 125 | 198 |
| Carbon sequestered 2020 to 2050, Mt C | 3.5 | 3.3 | 6.5 | 4.4 | 6.1 |
| Carbon loss due to development 2020 to 2050, Mt C* | –0.9 | –0.9 | –0.2 | –0.6 | –0.2 |
| Net carbon sequestered 2020 to 2050, Mt C | 2.6 | 2.4 | 6.3 | 3.7 | 5.9 |
| $CO_2$ | Baseline | SP | ST | TT | OLTW |
| $CO_2$ stored, Mt $CO_2$ | 83.9 | 77.2 | 100.7 | 87.4 | 91.9 |
| $CO_2$ sequestered, kt $CO_2$/y | 424 | 401 | 796 | 536 | 746 |
| $CO_2$ loss due to development, kt $CO_2$/y | –109 | –106 | –21 | –78 | –21 |
| Net $CO_2$ sequestration, kt $CO_2$/y | 315 | 295 | 776 | 458 | 725 |
| $CO_2$ sequestered 2020 to 2050, Mt C | 12.7 | 12.0 | 23.9 | 16.1 | 22.4 |
| $CO_2$ loss due to development 2020 to 2050, Mt $CO_2$* | –3.3 | –3.2 | –0.6 | –2.3 | –0.6 |
| Net $CO_2$ sequestered 2020 to 2050, Mt $CO_2$ | 9.5 | 8.8 | 23.3 | 13.7 | 21.7 |
| $CO_2$ sequestered as a % of total 2018 $CO_2$ emissions from all sources (BEIS estimate 4.1 Mt) | 8% | 7% | 19% | 11% | 18% |

* Carbon loss due to development is the carbon lost due to vegetation clearance and removal or disturbance of soil when sites are prepared for development, which is assumed to occur in the year the development takes place (although actually soil carbon loss may continue over several years from the date of clearance).

### 9.6.2 Constraints on available land

Although there is good potential to enhance carbon storage and sequestration by Oxfordshire's ecosystems, there will be trade-offs with other carbon reduction options and housing development, as shown in Table 9.2. The top part of the table shows the land use change for the different carbon reduction options in each scenario and the lower part shows how this affects the proportion of Oxfordshire's demand for food and bioenergy feedstock crops that can be met within the county.

As mentioned in section 9.5.2, Oxfordshire currently has enough farmland to produce the equivalent of 74% of its food requirements, so 26% has to be imported, which will cause emissions elsewhere. However, shifting to the Livewell diet with 75% less meat consumption would currently enable the county to produce all of its food requirements as well as freeing up 34,000 ha of land for other uses. Nevertheless, even with the Livewell diet, the scale of population growth planned for Oxfordshire would reduce food self-sufficiency back to only 74% by 2050. Under **Steady Progression**, loss of farmland due to planned housing developments reduces food production so that by 2050 only 40% of our food requirements can be met. Under the zero carbon pathways, additional loss due to ground-mounted solar, tree planting, biofuel feedstock crops and habitat restoration places further pressure on food production, but this is partly offset by agricultural productivity improvements.

## Table 9.2 Constraints on land use and implications for imported impacts

| | Steady progression | | Societal transformation | | Technological transformation | | Oxfordshire leading the way | |
|---|---|---|---|---|---|---|---|---|
| | 2030 | 2050 | 2030 | 2050 | 2030 | 2050 | 2030 | 2050 |
| Farmland used for tree planting, hedgerows, scrub or wetland (ha) | 605 | 1815 | 6228 | 18685 | 2094 | 6282 | 5562 | 16685 |
| Farmland restored to rough grazing (grassland or heath) (ha) | 50 | 150 | 2667 | 8000 | 0 | 0 | 1333 | 4000 |
| Hectares of land used for ground-mounted solar generation | 390 | 670 | 610 | 1,500 | 610 | 1,200 | 600 | 2,600 |
| Hectares of land used for bioenergy feedstock crops | 0 | 0 | 10,000 | 10,000 | 20,000 | 20,000 | 25,000 | 25,000 |
| Land converted to buildings and sealed surfaces | 6,000 | 9,342 | 2,225 | 3,483 | 4,539 | 6,974 | 2,225 | 3,483 |
| Land converted to private gardens | 1,289 | 2,272 | 980 | 1,429 | 859 | 1,576 | 980 | 1,429 |
| Land converted to public urban green space | 1,879 | 3,213 | 1,667 | 2,838 | 1,621 | 2,795 | 1,667 | 2,838 |
| Total area of new development | 9,168 | 14,827 | 4,871 | 7,751 | 7,020 | 11,345 | 4,871 | 7,751 |
| Farmland lost to development | 7,746 | 13,404 | 4,871 | 7,751 | 5,597 | 9,922 | 4,871 | 7,751 |
| **Total farmland lost for housing and carbon reduction** | **8,778** | **16,001** | **23,710** | **43,936** | **28,301** | **37,404** | **37,033** | **55,036** |
| Crop productivity increase compared to 2020 | 5% | 10% | 10% | 20% | 13% | 39% | 10% | 20% |
| Livestock productivity increase compared to 2020 | 0% | 0% | 2% | 5% | 3% | 10% | 2% | 5% |
| Population (driven by housing increase) | 814,326 | 1,000,458 | 814,326 | 1,000,458 | 814,326 | 1,000,458 | 814,326 | 1,000,458 |
| Farmland required to feed Oxfordshire (ha) without productivity improvements | 280,505 | 408,179 | 168,172 | 244,717 | 280,505 | 408,179 | 168,172 | 244,717 |
| Farmland required to feed Oxfordshire (ha) with productivity improvements | 277,301 | 399,279 | 160,001 | 221,703 | 267,310 | 358,342 | 160,001 | 221,703 |
| Farmland remaining (ha) | 167,366 | 160,143 | 152,434 | 132,208 | 147,843 | 138,740 | 139,111 | 121,108 |
| **Percentage of food demand met in Oxfordshire** | **60%** | **40%** | **95%** | **60%** | **55%** | **39%** | **87%** | **55%** |
| **Percentage of bioenergy feedstock crop demand met in Oxfordshire** | **0%** | **0%** | **10%** | **10%** | **20%** | **20%** | **17%** | **17%** |
| Hectares of land outside Oxfordshire needed for food (assuming same productivity) | 109,934 | 239,136 | 7,567 | 89,495 | 119,467 | 219,602 | 20,890 | 100,595 |
| Hectares of land outside Oxfordshire needed for bioenergy feedstock crops | 96,447 | 96,447 | 88,724 | 88,724 | 80,113 | 80,113 | 122,006 | 122,006 |

Under **Societal Transformation**, a combination of the Livewell diet and more compact housing development reduces the pressure on farmland, so that 95% of food demand can be met in 2030, but population growth reduces this to 60% by 2050. **Oxfordshire Leading the Way** is similar, but higher solar and biofuel production means that food sufficiency is slightly lower, at 87% in 2030 and 55% in 2050. **Technological Transformation** has double the improvement in agricultural productivity, but without dietary change food production falls to 39% of demand by 2050.

### 9.6.3 Summary: Is net-zero or zero carbon possible?

Although we have shown how the land use sector within Oxfordshire can be a net sink for emissions, can it reach zero carbon emissions, and what role can it play in helping the UK as a whole to reach net-zero, by offsetting residual emissions from sectors such as aviation and heavy industry?

To reach strict Zero Carbon, we would have to completely eliminate carbon emissions from the oxidation of soil organic matter and decay of vegetation that occurs when land is cleared for development, cultivated for agriculture or prepared for tree-planting. In the farming sector, all farming would have to be regenerative, i.e. more organic matter would need to be added to the soil than removed. The case study of Tolhurst Organics shows that this is possible, through the addition of compost and use of cover crops, while other regenerative agriculture projects are exploring new techniques such as mob grazing. However, zero carbon would also require an end to all development that removes topsoil and vegetation (i.e. all conventional housing and infrastructure development), leaving only the option of development on brownfield land.

Our analysis indicates that the less stringent target of net-zero within the land use sector in Oxfordshire is already being achieved at present, as sequestration offsets the annual losses from agriculture and development. However this does not take account of embodied emissions in the food and biofuels that we currently import, which we have not been able to quantify within the scope of this report. We are likely to move further away from this goal as the population increases.

Housing growth within Oxfordshire (and the wider OxCam Arc) indirectly affects our ability to contribute to net-zero for the UK as a whole. The Arc has a high proportion of the UK's most productive agricultural land: it covers 8.8% of England but contains 20.5% of the Grade 1 land, 15% of Grade 2 and 9.5% of Grade 3. Large scale housing growth on productive farmland in this region will displace food production to less productive areas, which is likely to increase overall emissions.

## 9.7 A pathway for sustainable land use decisions in Oxfordshire

This analysis has shown that a significant amount of carbon is stored in Oxfordshire's soils and vegetation, but this is at risk as habitats are cleared for housing or renewable energy development. There is potential to enhance carbon stocks and sequester as much as 20% of current annual emissions, but this depends on land being freed up through consumer choices to eat less meat, and strong planning policy to reduce the land taken and habitats lost to development.

However, even with optimum land use policies, the high projected growth in population will limit our ability to meet food and bioenergy demands within the county, meaning that a high proportion must be imported. This will lead to further emissions elsewhere, undermining efforts to reach net-zero within the county boundary. This highlights the importance of pursuing efforts to minimise the footprint of new development, encourage dietary change, cut food waste, sustainably enhance agricultural productivity, encourage land sharing for solar and food production, and reduce energy demand.

These measures not only reduce carbon emissions but also have significant potential health and economic co-benefits. For example, food waste costs the average family £700 per year, and over-consumption of animal produce is associated with health issues including obesity, diabetes and cancer.

If well planned, sequestration options such as woodland planting or habitat restoration can help to provide a range of other benefits including natural flood management, air and water quality improvement, soil erosion protection, and pleasant green spaces for recreation. Benefits for health and wellbeing can be maximised by locating new woodland and parkland close to where people live, such as in the Oxford greenbelt. Networks of attractive tree-lined footpaths and cycle paths can also encourage active travel, while green space and street trees can help to reduce the urban heat island effect and reduce surface water flooding. Investing in nature thus helps to make landscapes and communities more resilient to future climate change impacts.

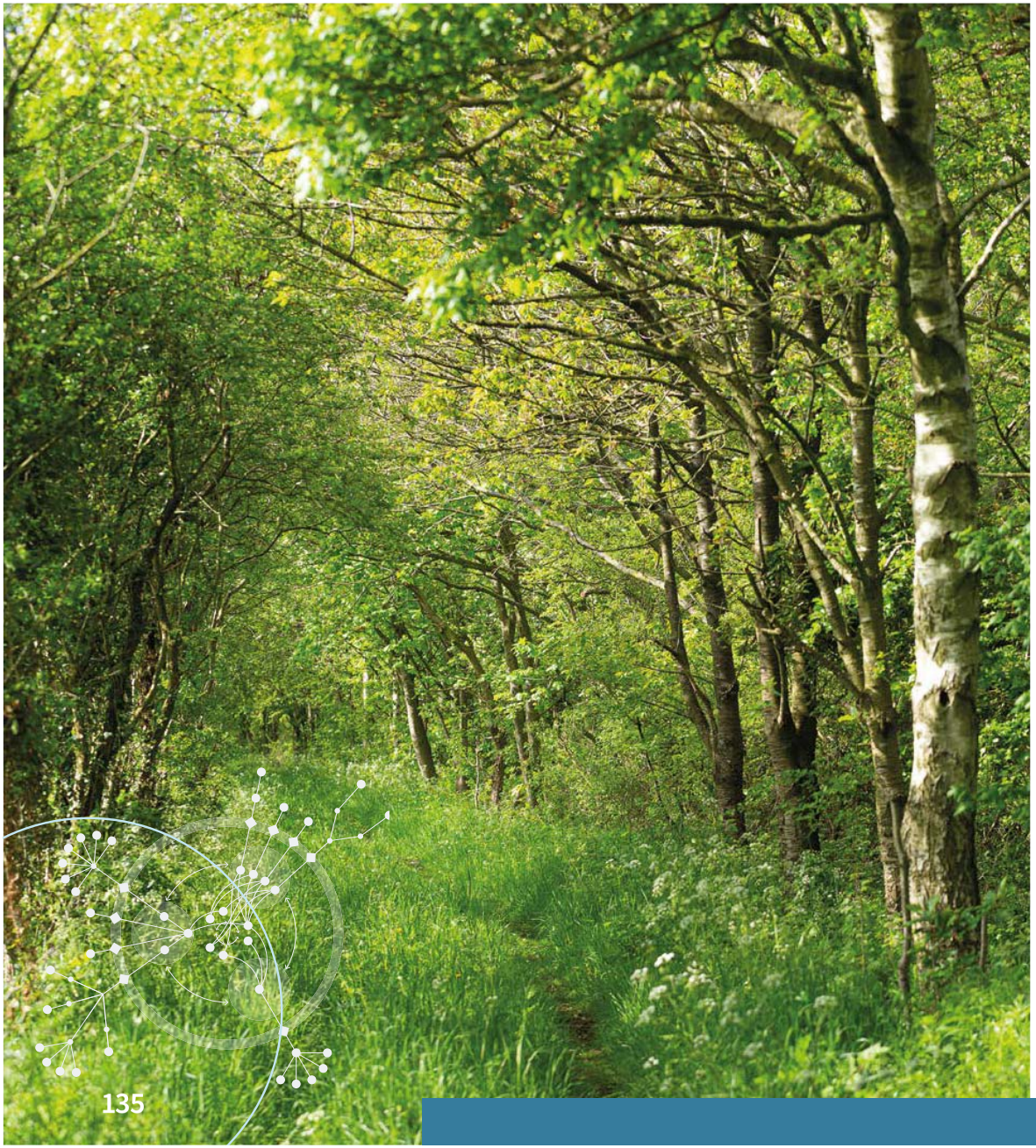
The economic and social value of these additional ecosystem service benefits can be very significant, as demonstrated in the OxCam Arc Local Natural Capital Plan pilot[180]. A recent report on the benefits of investing in Green Infrastructure in Oxfordshire suggests that investing £50M per year over 30 years could bring benefits worth £6 billion.[181]

There is strong potential for significant biodiversity benefits but only if interventions are planned carefully, using a diverse mix of native species, maintaining a balanced mix of habitat types and locating the right habitat in the right place. For example, floodplains are best restored as floodplain meadows, which are a nationally scarce habitat, rather than being used for planting woodland. Trees should never be planted on the few remaining examples of semi-natural grassland or heathland remaining in Oxfordshire.

Plantations of faster growing, non-native conifer species are useful for providing timber and typically sequester carbon at a higher rate than native trees for the first few decades of growth, but this carbon may be released when the trees are harvested, unless the wood is used to make long lived timber products. However, non-native tree species have little biodiversity value compared to native trees such as oak and beech that support hundreds of species of insects, birds, bats and fungi. In future, there is a need to select a diverse mix of species that are resilient to expected climate change, pests and diseases.

180 Ox Cam LNCP.

181 Schüder, I (2020). Making the case for investing in Green Infrastructure in Oxfordshire. A report commissioned by Oxfordshire County Council.



There can also be trade-offs associated with woodland management. For example, targets to 'bring more woodlands into sustainable management,[182] involve regularly thinning and extracting trees and clearing understorey vegetation and shrubs to provide woodfuel and timber and promote tree growth. This large scale extraction of biomass gives woodlands a 'tidy' appearance appreciated by some visitors but can have negative impacts on biodiversity by removing cover and food resources for birds and other wildlife, which affects other visitors adversely.[183] However, other management options such as leaving hedgerows to grow larger rather than trimming every year can have benefits for both carbon storage and wildlife.

All land use change options will affect not only biodiversity but also landscape, heritage and amenity. These are important considerations when planning solar farms, biofuel plantations, afforestation, housing and infrastructure.

To maximise co-benefits and avoid undesirable trade-offs, stakeholders need to be supported to work together, ideally via the proposed Local Nature Partnership. Landowners and farmers need the right support and incentives to be able to protect and restore ecosystems on their land. Forthcoming changes to agri-environment support mechanisms such as the proposed ELMs scheme, replacing the CAP mechanisms, will be critical, as will the forthcoming Biodiversity Net Gain legislation, but there is much that local stakeholders can also do to develop and promote best practice. There is also a need for better metrics, monitoring and assessment of the actual carbon and biodiversity impacts of different habitat restoration options being conducted in Oxfordshire.

Photo: David Griffiths on Unsplash

182 Sylva Foundation and TOE (2016), In a nutshell.

183 Heyman, E et al. (2011). Openness as a key-variable for analysis of management trade-offs in urban woodlands. *Urban Forestry & Urban Greening*, 10: 281–293.

# 10 Conclusions and recommendations

This report has provided a comprehensive assessment of Oxfordshire's carbon emissions, including recent trends in transport, the built environment, energy and land use. The county is currently on track to achieving the 50% emissions reduction target by 2030 set out in the Oxfordshire Energy Strategy, on the basis of substantial achievements in decarbonising electricity supply and increased energy efficiency. However, progress remains slow when it comes to decarbonising transport, reducing reliance on fossil fuels for heating, and enhancing the natural environment for increased carbon sequestration.

Photo: Ben Seymour on Unsplash

This study set out four scenarios for Oxfordshire from today to 2050. Our **Steady Progression** scenario falls well short of stated climate aims, and illustrates the scale of change needed to achieve net-zero. The three pathways which achieve net-zero by 2050 adopt distinct approaches to eliminating carbon emissions from Oxfordshire's economy. **Societal Transformation** is led from the bottom up, with householders adopting new technologies and practices, and community groups corralling action. **Technological Transformation**, by contrast, relies on systemic changes driven at the national level, including the deployment of hydrogen for heating and other technical solutions which require the least change to individual behaviour. Finally, **Oxfordshire Leading the Way** mirrors the widespread cultural and behavioural changes seen in **Societal Transformation**, and combines this with high deployment of new local electricity generation using solar photovoltaics.

Despite their distinct differences, the three net-zero pathways have several features in common, with similar implications. Each of them involve:

- the substantial expansion of solar generating capacity in Oxfordshire. Large ground-mounted solar parks are preferred in **Technological Transformation**, with others seeing the widespread deployment of rooftop arrays. The business case for new installations will rely on the falling price of photovoltaic panels and battery storage, and will face the challenge of geographically varied grid constraints.
- a major programme of retrofit for existing homes and non-domestic buildings, led by strong and consistent national policy including significant subsidy.
- a strict approach to planning, regulation and compliance for new homes and developments so that they do not result in increased carbon emissions from the building, transport, or energy sectors.
- substantial increases in electricity demand, driven by heat and transport, requiring grid reinforcement and flexibility provided by various means.
- the phase out of gas boilers and fossil-fuelled modes of transport.
- a need for innovation in food production to maintain or increase output while agricultural land makes way for development, and Oxfordshire grows its fair share of biofuels.
- a reduction in overall travel demand.
- restoration of ecosystems and natural capital, for enhanced sequestration and increased biodiversity.

## 10.1 High level implications for local policy and community action

**Co-benefits of the transition**. If the phase-out of carbon emissions is managed effectively, there are a variety of economic, social and environmental benefits which can be achieved. These include the creation of high-skilled, well paid jobs in the zero carbon sector; creating cohesive and desirable places to live by empowering local communities to drive action; improving air quality; improving health through active travel and energy efficient homes; and regenerating ecosystems and habitats for wildlife.

**Oxfordshire Leading the Way** is the scenario which is likely to generate most co-benefits. Here, the transition is community-led, involving lifestyle change and innovative business models which drive the circular economy. Although substantial investment is required, the benefits of this are felt locally, with a high proportion of clean energy installations owned by local residents, and zero carbon products and services delivered by local businesses. By contrast, **Technological Transformation** sees fewer co-benefits in Oxfordshire, as investments are focused outside the county into hydrogen production, CCS and offshore wind, and there are even some trade-offs for biodiversity.

### Shattering myths

**"We should plant trees to offset our emissions"**

**…** we need to protect existing trees, but planting new trees can remove only a small fraction of current emissions, and we need to restore a mix of native ecosystems to reverse biodiversity loss.

**"We need a more skilled & qualified workforce"**

**…** the skills challenge is not just a supply problem, we also need demand for skills, which means new kinds of jobs and business models in new markets for zero-carbon solutions.

**"Electric vehicles are coming to save us"**

**…** switching to cleaner fuels is insufficient for net-zero. We also need to reduce our transport demand and complete more of our journeys by walking, cycling, public and shared transport.

**"Net-zero can be achieved by 2030"**

**…** without relying on offsets,and without significant new powers for local authorities, achieving net-zero ahead of the national target will be extremely challenging.

**"Fossil fuels are needed for economic growth"**

**…** renewable energy and other zero-carbon solutions represent opportunities for more efficient use of resources. Unlike spending on fossil fuels, investment can be kept local.

**"It all comes down to individual behaviours"**

**…** while lifestyle change and sustainable choices will be crucial, these are influenced by infrastructures, systems of provision and social norms. Reshaping these requires action from myriad actors.

**The need for disincentives**. While the net-zero transition will generate a variety of opportunities for businesses and householders, there is also a need to disincentivise high-carbon activities. These may include the implementation of zero-emissions zones in Oxfordshire's towns and villages, not just Oxford City; or using planning powers to develop policies that align with net-zero carbon developments by applying 15-minute neighbourhood principles, implementing active travel infrastructure, and including ecosystem restoration. It will also mean rejecting planning applications or discouraging major inward investment associated with unsustainable development and the fossil fuel economy. Enforcement of existing regulations such as the Minimum Energy Efficiency Standards (MEES), or of contract-terms with operators of electric vehicle charging infrastructure remains a challenge for resource-constrained local authorities, but will become increasingly important.

**Equity, justice and inclusivity**. It is becoming increasingly clear to policy-makers at all levels that the transition must be fair and inclusive. Each pathway to zero carbon outlined in our scenarios chapter has implications for equity and justice. **Technological Transformation**, for instance, involves the least disruption to existing behaviours and lifestyles, with high use of private vehicles, lower rates of building retrofit, and hydrogen boilers installed as 'drop-in' replacements for gas incumbents. While private transport and heating in buildings are fully decarbonised in this scenario, these solutions do little to address inequality, as electric vehicles remain unaffordable to many, and the high cost of hydrogen coupled with leaky buildings means that heating bills increase, impacting the poorest hardest.

In both **Societal Transformation** and **Oxfordshire Leading the Way**, individuals and communities play an active role in driving down carbon emissions by adopting active travel, making greater use of public transport, installing rooftop solar, eating less meat and adopting flexible energy practices. However, the capacity to engage in such behaviours is unevenly distributed. Access to public transport is considerably more limited in rural areas compared with Oxford City, while active travel modes require physical capabilities which are not possessed by all. The ability to adopt the technologies to drive down emissions such as electric vehicles, heat pumps, solar panels and domestic batteries varies according to wealth, income and whether residents own their own homes and have access to off-street parking.

Achieving zero carbon emissions in Oxfordshire will require substantial investment as well as changes in the ways businesses and individuals move and use energy. These transformations can be leveraged to reduce inequality and empower marginalised groups, and there is a crucial role to be played by stakeholders such as the local authorities, the Growth Board, OxLEP and major employers to drive progressive change through their policies and strategies for investment. This includes support for local initiatives such as the Community Action Group network and the Oxfordshire Social Enterprise Partnership, as well as local authorities promoting flexibility practices and community-scale investments in solar generation or domestic energy efficiency, to achieve economies of scale.

## Local differences in net-zero targets, and the implications of pre-2050 targets

While each local authority in Oxfordshire has set an aspirational date for area-wide net-zero emissions, these vary widely. Oxfordshire County Council is planning for 2050, in line with the UK goal, while Cherwell DC seeks to work with partners to achieve net-zero, district-wide, by 2030. These differences have substantial implications for policy, investment and local action which could be significant given the collaborative effort required.

Our net-zero scenarios each focus on 2050, reflecting the scale of change needed across all sectors of the economy. The implications of ambitions to eradicate emissions before then, without resorting to carbon offsetting, are clear. Near-term and extensive transformations would be needed in everyday lifestyle and consumer choices, alongside significant investment in electrified transport and a comprehensive rollout of building insulation and heat pump technologies, delivered by a rapidly trained, skilled workforce. While the ambition expressed by local policy-makers in setting net-zero targets ahead of the national target is important for mobilising investment, motivating residents to change behaviour and supporting policy change, the scale of investment, and change in usage of transport, energy and land are enormous. Without significant devolution of additional powers to local authorities, it will be extremely challenging to implement the policies required to deliver net-zero before 2050. However, there are additional ways to demonstrate leadership on climate change as well as target setting, such as in using planning powers to insist on zero-carbon development, implementing low traffic neighbourhoods and zero emissions zones.

**The planning system**. The planning system needs to be aligned with zero carbon targets, as it can influence the design and viability of many of the solutions needed to address climate change. It can determine the conditions under which strategic renewable projects can go ahead, and set policy and guidance for the design and layout of our built environment. It is one of the only ways that the spatial elements and design standards for energy efficiency and carbon reduction can be applied as a condition of planning. So, whilst the Climate Change Act has set the national net-zero goal, this can only be truly achieved if it is properly 'planned' for at the local level.

Most adopted Local Plans, many of which were largely developed prior to the adoption of net-zero targets, do not reflect the level of challenge and difficulty inherent in reaching these targets by 2050, and the implications this will have for the planning system and place-making more widely.

The transition to net-zero will require: super energy-efficient design in new developments, incorporation of a fit-for-purpose electric charging network, mass retrofit and energy efficiency upgrades of aging building stock, removal of gas networks to allow for low carbon heating alternatives, and significant modal shift away from private fossil-fuelled vehicles to active modes of travel and public transport.

The local planning system does not have the power to make all these changes alone, but it has a key role to play in driving changes related to publishing design guidance for zero-carbon standards for new builds, supporting strategies for local infrastructure, and determining the spatial patterns of land use. Greater weight needs to be given to climate issues if planning is not to act as a brake on zero-carbon ambitions . Local planning has very little power over carbon-emitting activities such as agriculture, aviation, and shipping, as well as nationally-significant infrastructure decisions.

Future Local Plans, Oxfordshire Plan 2050 and the Oxfordshire Infrastructure Strategy must incorporate the need for substantial grid upgrades to service an extensive electric vehicle charging network and the electrification of heat; allocate land for new solar installations; and prioritise building-fabric in both new build and retrofit when identifying regeneration opportunities. There is a critical role to play in minimising land take and transport emissions by specifying the creation of compact, walkable developments close to existing or planned public transport links, and incorporating walking and cycling infrastructure into all new developments. Planners can also protect and enhance existing woodland, hedgerows, wetlands and other carbon-rich habitats from development.

Meanwhile, the current national building regulations are insufficient to create, or even identify, true zero-carbon buildings. This is due to the 'energy performance gap' between design and reality, the incomplete assessment method, and the fact that the regulations exclude energy used by plug-in appliances. Better standards, tools, methods, skills and collaborative teams are needed to make zero-carbon buildings a reality, as demonstrated by the Passive House approach.[184] The forthcoming Future Homes Standard marks a welcome end to nearly a decade of national policy stagnation for housing, but the detail of the new policy is yet to be decided and is not due to come into force before 2025. There is uncertainty over exactly what the standard will be, how it will be applied, and how it might align with the ability of local authorities to set different requirements over different timescales.

It is also helpful to set metrics not only for carbon, but for total energy use, so that new-builds do not put added strain on an electricity grid which is coming under pressure from the electrification of vehicles and heating – in line with local and national zero-carbon goals.[185]

Whilst there are limits to local planning authorities' power to raise the bar for new developments' energy and carbon performance or influence building regulations through design guidance, the relative 'weight' of these duties and powers has not yet been thoroughly tested in legal terms. This may result in some hesitancy, but local planning authorities need to take bold steps now towards achieving zero emissions buildings and adopt policies that drive drastic and rapid emissions reductions from transport, energy and land use. An increasing number of local authorities are already using their local powers to raise energy standards higher than those set by national building regulations. Ambitious examples from Cherwell DC and West Oxfordshire DC include their NW Bicester policy and Salt Cross Area Action Plan[186] respectively. Examples from elsewhere include Reading Borough's Zero Carbon Policy and the London Plan that stipulates all new major residential developments must be 'zero carbon'.

If the local planning system is to genuinely contribute to the net-zero transition and not act as a barrier, then it is also imperative that planning authorities are adequately resourced and skilled, and supported by a strategic approach at the county or subregional scale.

184 Passivehouse.com.

185 UKGBC (2020), The Policy Playbook: Driving sustainability in new homes – a resource for local authorities.

186 At the time of writing, the Salt Cross AAP is being examined by the Planning Inspectorate.

**COVID-19**. More than 1000 people in Oxfordshire have lost their lives to COVID-19, and the pandemic has had a severely detrimental impact on nearly all residents and businesses in Oxfordshire. In the short term, energy demand and carbon emissions have fallen by roughly 8%8 – a significant change, but moderate given the unprecedented disruption to daily life caused by 'lockdowns'. As the economy gets back on its feet, it is imperative that the sustainable practices adopted by businesses and individuals, such as telecommuting and active travel, are supported and sustained. As businesses struggle to stay afloat following the COVID-19 pandemic, there is a risk that investment in zero carbon measures are deprioritised. And yet, businesses are more aware than ever of the need to build resilience, and ensuring that their products, services and operations are compatible with a zero-carbon future is now a crucial component of effective risk management. Unlike the period following the economic downturn in 2008, recent evidence suggests that public support for climate action is likely to remain high,[187] so that although strong policy interventions such as low traffic neighbourhoods and bus-gates will continue to divide opinion, local policy-makers can continue to push the zero carbon agenda with confidence.

**Infrastructure**. The forthcoming update to the Oxfordshire Infrastructure Strategy is due to include climate related indicators when evaluating the need for strategic infrastructure. While it goes without saying that all investments in local infrastructure should be compatible with zero carbon emissions, there is also a need to systematically review the role of existing infrastructure in 'locking in' high carbon practices, and plan for change. This includes, for instance, railway electrification and the allocation of road space to walking and cycling.

187 CAST, 2020. How has COVID-19 impacted low-carbon lifestyle and attitudes towards climate action? (CAST Briefing 04). Centre for Climate Change and Social Transformations.

In an effort to address one of the biggest challenges associated with the zero-carbon transition, the Scottish government designated energy efficiency as a national infrastructure priority, and has experimented with Local Heat and Energy Efficiency Strategies as a means to coordinate actions across neighbourhoods, not just in individual buildings. Our review of progress since 2014, and Chapter 7 on heating in buildings, showed that progress on domestic energy efficiency continues to be inadequate. National regulation is needed to provide a framework in which energy efficiency and demand reduction can integrate with changes on the supply side for heat. New forms of governance will be needed, as well as new markets for building retrofit, skills investment and innovations in new business models.

Green infrastructure has a vital role to play in a zero-carbon Oxfordshire, yet consideration of this in the first Oxfordshire Infrastructure Strategy was limited to an inventory of designated areas such as nature reserves. The update brings an opportunity to incorporate the new Oxfordshire Natural Capital map,[188] which shows the multiple benefits of all types of green infrastructure including semi-natural habitats, domestic gardens, watercourses, footpaths, verges and farmland. This enables and encourages a more nuanced view of the synergies and trade-offs between green and grey infrastructure, as discussed in Chapter 9. The natural capital map shows high value assets, highlighting the need to protect high grade farmland, to minimise the footprint of new development, and to protect existing habitats including trees, hedges and semi-natural grassland from development. There are also opportunities for synergies such as new green walking and cycling routes to encourage active travel, and restoration of habitats to provide natural flood management, erosion protection and air and water quality benefits.

188 Smith (2019), Natural capital mapping in Oxfordshire: short report.

**Embodied carbon**. This report has focused on direct emissions (Scope 1) and those associated with purchased energy (Scope 2). However, there are emissions 'embodied' in the goods and services imported into the county, including the materials used for constructing new housing, the batteries used in electric vehicles, and food and biofuels that must be produced elsewhere when land in the county is used for carbon-reducing activities such as planting trees. In the next decade, the priority must be on reducing Scope 1 and 2 emissions. However, as the emissions associated with energy and transport usage reduce over time, the relative proportion of embodied emissions will grow. Whilst it is often difficult to accurately quantify embodied emissions, climate change will need to be increasingly factored into procurement decisions and supply chain governance, whether those are major investments in construction materials for new homes, or everyday purchases such as food. A shift towards a circular economy based on reducing waste and unnecessary consumption will play a large part in reducing the embodied emissions imported in material goods.

**Data at the 'Grid Edge'**. As the energy system becomes increasingly decentralised, gathering the spatial and temporal information needed to optimise grid management, enable flexibility markets and inform low carbon technology investment is crucial. Compared with a centralised system, collecting data from thousands of distributed assets presents a major challenge. As highlighted in this report, data on renewable heat generation, energy efficiency installations and electric vehicle charging infrastructure is currently insufficient in terms of coverage and granularity, considering their critical role in driving down emissions. In Project LEO, SSEN and partners are directly addressing this problem by installing monitoring devices across the low voltage distribution network. There is a need for similar efforts to monitor progress in decarbonising heat, transport and enhancing natural capital.

**Skills**. With historically low levels of unemployment, businesses in Oxfordshire have highlighted in recent years the challenges associated with recruitment.[189] Niche high-tech industries requiring advanced technical skills or scientific knowledge already face difficulties finding suitable employees. Challenges around skills and training are likely to proliferate into sectors such as construction, HVAC and automotive maintenance, as these trades play a crucial role in delivering the solutions to decarbonise buildings and transport. At present, there is very low demand for the work that is required to decarbonise these sectors, and where there is a low demand for skilled work there is, by definition, a low demand for skills training. The challenge of low-carbon skills is therefore more than simply a lack of provision; it is a lack of real demand for (and use of) skills in the workplaces where the zero-carbon activity will be needed.[190] To tackle these issues effectively requires a much greater level of coordination between policies for energy, industrial strategy and education.[191,192] There is an important role for government in anticipating the types and quality of work required in a zero-carbon economy and in setting out occupational standards to complement the energy performance standards that will also be needed.[193,194]

189 OxLEP (2019), Skills and labour market research evidence pack.

190 Keep, E. (2016). Improving skills utilisation in the UK – some reflections on what, who and how? SKOPE research paper 124, August 2016. Centre on Skills, Knowledge and Organisational Performance, Oxford: University of Oxford.

191 Wolf, A. (2004). Education and economic performance: simplistic theories and their policy consequences. *Oxford Review of Economic Policy*, 20(2): 315–333.

192 Green, A. (2016). Low skill traps in sectors and geographies: underlying factors and means of escape. Institute for Employment Research, University of Warwick, September 2016.

193 Killip, G. (2013). Transition management using a market transformation, approach: lessons for theory, research and practice, from the case of low-carbon housing refurbishment in the UK. *Environment and Planning C: Government and Policy*, 31: 876–892.

194 Killip, G. (2020). A reform agenda for UK construction education and practice. *Buildings and Cities*, 1(1): 525–537.

Partnership working. One of Oxfordshire's strengths when it comes to the low carbon economy is the extent to which key stakeholders are willing to collaborate, and the membership of the steering group for this report provides evidence of this. This is a strength which can be further built upon, with the expansion of existing networks such as Oxfordshire Greentech, Community Action Group network and Low Carbon Hub CIC. The Oxfordshire Growth Board recently proposed the creation of a new environment advisory group which was supported by all local authority leaders. If properly resourced, this could drive forward the agenda set out in the Oxfordshire Energy Strategy, and begin to develop an action plan to meet climate goals. It is hoped that the evidence and modelling in this report will directly inform this advisory group, as well as the work of the proposed Local Nature Partnership.

**Financing the transition**. Local authorities have experienced significant funding cuts in the last decade, and COVID-19 has led to further financial woes. Although the current model of funding competitions is problematic at a national scale,[195] Oxfordshire's councils have been very successful in developing projects to attract central government investment in transport and energy innovation in recent years. While the Climate Change Committee rightly highlights the need for funding to increase skills and capacity at the local level, Oxfordshire's local authorities have nearly unparalleled knowledge and expertise on low carbon innovation. Nonetheless, with increased attention and the proliferation of projects in recent years, officers have been under strain.

In particular, there is a need for increased know-how relating to green finance, sustainable procurement, and the challenge of translating sustainable innovation projects into ongoing operations and contract management.[196] Increasing specialist resources across the local authorities will not only help to drive local action, but can also be used to support other regions in their own net-zero transitions.[197]

There remains uncertainty over the future of core funding for programmes to drive down emissions, for instance it is so far unknown which priorities the Shared Prosperity Fund will focus on. With the dissolution of the European Structural Investment Funds (ESIF), there is a risk that key areas such as funding for energy efficiency and eco-innovation in SMEs is lost. Local actors should lobby central government for investment on zero-carbon initiatives across multiple sectors, and for funding streams to be flexible to give local decision-makers maximum influence over expenditure. While the loss of ESIF presents a risk to the zero-carbon transition, there is now an opportunity to re-evaluate investment priorities for the Shared Prosperity Fund, and to streamline administrative processes.[198]

195 CCC (2020), Local Authorities and the Sixth Carbon Budget.

196 The City Council's experiences of deploying EV charging infrastructure as part of Go Ultra Low Oxford and Energy Superhub Oxford are illustrative.

197 Schwanen, T., 2015. The bumpy road toward low-energy urban mobility: Case studies from two UK cities. *Sustainability*, 7: 7086–7111.

198 National Centre for Universities and Business (2018), What comes after the end of European Regional Development Funding?

The 2014 Low Carbon Economy report recommended that an Oxfordshire Green Bond could be a means for raising investment in support of the deployment of renewable energy technology and other assets. This remains the case, as highlighted by the Growth Board Scrutiny Panel in March 2021.[199] The Low Carbon Hub have pioneered community investment in renewables, and there is an opportunity for local authorities to put their weight behind similar financial models. West Berkshire Council launched a Community Municipal Investment in July 2020 and have so far raised over £537,000 for a series of solar projects. Bristol's LEAP initiative is aiming to bring together a range of energy and infrastructure investment opportunities, using a joint venture model.[200] They are currently procuring a strategic partner to help realise their vision for £1bn green investment, recognising that the majority of funding for the zero-carbon transition will come from the private sector. Another potential opportunity for financing zero-carbon initiatives such as renewable generation is the Oxfordshire Local Government Pension Fund, which recently implemented a climate change policy committing to switching 11% of its assets into a low carbon fund. The Trust for Oxfordshire's Environment, BBOWT and Wild Oxfordshire are also aiming to develop an Oxfordshire Carbon and Nature Fund to channel both private and public investment into sustainable Nature-based Solutions with both biodiversity and carbon benefits.

199 Oxfordshire Growth Board Scrutiny Panel (2021), Recommendations from the Private Investment In Public Infrastructure Projects Task and Finish Group.

200 Bristol City LEAP.

## 10.2 Sectoral implications and recommendations

### 10.2.1 Innovation for zero carbon

All three net-zero scenarios require sizeable changes to our current way of life. With the **Technological Transformation** and **Oxfordshire Leading The Way** scenarios, mass scale-up and roll-out of technological innovation is a necessity, which will only be achievable through supporting the existing low-carbon innovation ecosystem to grow with adequate policies, investment and consumer-led behavioural shifts. Zero-carbon innovations need to not only deliver efficient carbon reductions at scale but also incorporate consumer-facing solutions that reduce demand, and ease the behavioural shift required to maximise the efficacy of these technologies.

With this in mind, we identify three key areas for focus in the coming years:

**A green economic recovery**: As we begin to overcome and recover from the COVID-19 pandemic, it is imperative that people and businesses in Oxfordshire seek to embed those innovative behaviours and practices developed through 'lockdown'. Businesses have never had to be so agile, and as we pursue a green recovery, leaders should consider how consumer choices and staff preferences may change. Whereas public concern for climate change fell after the recovery from the economic downturn starting in 2008, there are signs that the public will support strong climate policies after the current recession.[201] The period of flux in the coming years will present opportunities to low carbon innovators to provide the goods and services to drive both the economic recovery and the path to net-zero.

201 CAST, 2020. How has COVID-19 impacted low-carbon lifestyle and attitudes towards climate action? (CAST Briefing 04). Centre for Climate Change and Social Transformations.

**Raising investment/funding**: According to a survey conducted by Advanced Oxford in 2020, the biggest challenge facing innovative companies is raising investment[43]. Despite significant investment made by organisations such as Oxford Sciences Innovation (OSI), Oxford University Innovation and the Oxford Investment Opportunity Network, there remains a need for financial support to drive the sustainability transition. While attention often goes to innovative start-ups, large incumbent businesses in manufacturing, energy, transport, construction and other sectors are those which will generate the greatest investment in zero carbon solutions. The opportunities represented by low carbon innovation in Oxfordshire should be promoted by economic development stakeholders such as OxLEP, to attract new venture, corporate and institutional investors, and encourage low carbon businesses to locate here.

**Building an inclusive low-carbon economy**: Whilst low-carbon innovation in Oxfordshire is thriving, the majority of those in environmental professions are white, male, and middle-class.[202] Within the low-carbon innovation sector, there is a need for greater diversity,, including greater ethnic diversity and a more equal gender balance. The Oxford branch of Women in Sustainability is active and popular, but there are no equivalent networks bringing together those involved in the sustainability movement from ethnic minority groups. With increasing awareness amongst all stakeholders of the need for an inclusive and just transition, more effort is needed to foreground diversity. More profoundly, the challenge of a zero-carbon economy will be to integrate some aspects of carbon management into many sectors that have not traditionally been seen as 'green'. Many low- and middle-income jobs in service sectors will need to change in subtle, but far-reaching ways if zero-carbon is to be a reality. The zero-carbon imperative needs to be reflected in industrial and economic policy, and it needs to be done in ways that are just and inclusive.

202 Policy Exchange (2017), The two sides of diversity.

### 10.2.2 Transport

All three net-zero scenarios require phasing out close to 100% of fossil-fuel powered vehicles for transport (improve), but also some reduction in travel demand (avoid) and increases in the share of public, shared and active travel (shift). Internet connectivity has become a crucial factor for reducing demand for travel, and choices over the location, density and mix of housing, amenities and services will determine Oxfordshire's ability to decarbonise transport.

The implications for decarbonised transport should be considered at all stages of the planning process, from policy writing and land allocation to planning permission for individual developments or changes of use. Local Plans and accompanying design guidance should set out policies and objectives for place-making and integration with the County-level Local Transport and Connectivity Plan. Local government and community positions should also highlight opportunities for and threats to local amenities, from green space to post offices, that avoid and shift travel.

Engagement with individuals and businesses will also be essential to enabling 'Avoid' and 'Shift' of Travel. Employers should be engaged in identifying opportunities to use internet connectivity to enable remote working and reduce commuting. Employers will also play a role in supporting variable schedules that optimise both essential and occasional commuting by public transport. Those involved in retail, freight and logistics will need to collaborate with the public sector to find new ways to store and deliver goods.

All pathways to net-zero transport involve the rapid and extensive electrification of vehicles and rail. Not only will this drive up demand for electricity, but it will place significant demands on the existing grid infrastructure. Linked to the need for better data and information at the 'grid edge', there is need to incorporate those involved in grid management (namely SSEN) into transport planning discussions. Flexibility practices can mitigate the need for costly grid upgrades, and should be promoted by a wide range of stakeholders, not just those within the energy industry.

Switching from road building to road space reallocation and demand management measures will support other investments to decarbonise transport, offer value for money, and have co-benefits for place-making and public health, but such solutions need community support. Measures such as the zero emissions zone, workplace parking levy, and controlled parking zones can raise funds for investment in active travel and public charging infrastructure. Public engagement is necessary to ensure such schemes are equitable and inclusive.

COVID-19 has generated significant uncertainty over the future of rail travel and the viability of rail improvements. Uncertainties are also inherent in the governance structures within the transport sector and divided responsibilities for decarbonising transport. To renew confidence in public transport, especially rail, public engagement and communication with residents and businesses will be essential, as will Oxfordshire's strengths in creating networks and collaborations between sectors and that integrate policy and regulation at all levels of government.

### 10.2.3 Building energy efficiency and heating

Building energy efficiency has widely recognised benefits beyond energy saving, cost saving and $CO_2$ emissions. In the housing sector energy retrofit is key to eradicating fuel poverty and generally making homes healthier and more comfortable. There are co-benefits for health and social care services of warm and efficient homes, and retrofit is recognised as part of Oxfordshire's Joint Health and Wellbeing Strategy.[203] Retrofit is also good for jobs, and has been identified by many economists as a key strategic action to boost economic recovery from the Covid-19 pandemic, while also contributing to climate mitigation.[204] Even so, evidence from the BEIS-supported retrofit supply chain demonstrators (including Cosy Homes Oxfordshire) points to a very immature market for retrofit, and a supply chain that is wary of government-backed initiatives after the high-profile failures of the Green Deal and the Green Homes Grants scheme. Better national policy is needed before significant progress can be made, and various government consultations are promised, including for a Heat and Buildings Strategy.

For non-domestic buildings stronger regulations are also needed, but so is an ongoing engagement with property owners and managers to make continuous improvements over time. The key challenge is to align efficiency and heat decarbonisation goals with each organisation's strategic objectives. Given the wide variety of organisations covered by the term 'non-domestic sector' there is no 'one size fits all' approach in terms of technology or investment.

203 Oxfordshire Joint Health and Wellbeing Strategy (2018–2023).

204 For example, New Economics Foundation (2020), A green stimulus for housing: The macroeconomic impacts of a UK whole house retrofit programme.

Organisations need bespoke support from a network of skilled business and energy advisors so that decarbonisation options are considered at key moments of capital investment and operational management. Energy Solutions Oxfordshire has begun some of this work, and it could be usefully extended and expanded. The facilitation of networks can be an effective way to share good practice and build up a community of practice around decarbonisation.

The planning system also needs to be better prepared for, and disposed to, some of the changes that will be needed in buildings and streetscapes. Visual amenity and heritage value are important factors to weigh in the balance of planning decisions, but a zero-carbon future will, out of necessity, involve some disruptive changes to familiar built environments. There is a need to re-balance priorities so that more actions to improve energy efficiency can be achieved, even where that makes minor changes to the appearance of buildings. Oxfordshire could usefully take a lead in a nationally relevant debate about planning priorities, framed around the need to make subtle but profound changes in the built environment for a zero-carbon future.

### 10.2.4 Renewable energy

Solar PV is Oxfordshire's largest renewable resource and will need to be exploited in all plausible net-zero scenarios. For Oxfordshire to lead the way, the annual rate of solar installation needs to increase by 5–10 times compared with the previous five years, and then sustain for the next three decades. Recent trends have fallen short of this due to reductions in Government support, although there is evidence the market is starting to recover. Nonetheless, even in our most ambitious scenario, Oxfordshire will continue to rely on zero- (and ultimately negative) carbon electricity imported from outside the county.

Ambitious early action will build momentum and Oxfordshire has a well-established community of local energy action groups, early adopters and a proven appetite for community funded energy projects which must be nurtured and used as a springboard for mass adoption. To maximise local value, installations which directly reduce local electricity imports (behind-the-meter installations such as rooftop PV and local PPAs) should be targeted and could benefit from local facilitation. While technology costs continue to fall, pre-installation costs (including network connection), risk management and sector expertise remain barriers for easy development. Local partnerships that include community groups, landowners, SMEs and DNOs can help overcome these barriers through knowledge sharing, strategic infrastructure planning and novel financing arrangements.

Solar PV is not the only low carbon generation option in Oxfordshire. Bioenergy, hydro and wind have all been exploited to varying degrees and their potential should continue to be considered. While still relatively small, agricultural waste and onshore wind offer the largest untapped resource besides solar. Onshore wind, a non-starter in recent years due to central government planning policy, could contribute in the future if local attitudes and political will respond to the climate emergency. Oxfordshire is part of a wider national energy system which does not align with local political geographies. The county is unlikely to be a net exporter of energy in the next 30 years, so to achieve zero emissions as fast as possible, Oxfordshire's stakeholders have a role to play in providing the expertise, ambition and finance to guide national strategy. Reducing energy demand is critical to achieving net-zero in all pathways and must occur in a multitude of ways including improved building fabric, active travel and electrification of transport and heating.

Mass adoption of EVs and heat-pumps will reduce emissions quickly due to their high efficiency and a rapidly decarbonising electricity system, but their uptake needs to be supported with charging infrastructure, building fabric-retrofit, and a workforce of skilled installers. As Oxfordshire has few industrial activities considered difficult-to-electrify, reaching a net-zero energy system faster than 2050 is possible, but cannot be done drastically ahead of the national system.

However, electrification poses challenges for electricity networks which will require infrastructure upgrades and smart network management to overcome additional strain placed on an already constrained system. Flexibility and data at the grid edge are required to maximise infrastructure utilisation in a cost-effective way. Local partnerships must work together with network companies to ensure local context-specific solutions are incorporated as early as possible. The innovation projects already underway (such as Project LEO) must be capitalised on.

Finally, the fastest and deepest decarbonisation pathways require societal change which puts people at the heart of delivering a net-zero energy system; from users being actively engaged in the energy system to the installers and intermediaries delivering the new technologies which must be embraced. Local authorities, local businesses and knowledge hubs have an important role to play as trusted entities to foster this societal change.

### 10.2.5 Land use and sequestration

There is intense competition for land for agriculture, housing and infrastructure, which can limit the deployment of low carbon options such as ground-mounted solar, biofuels, tree planting and ecosystem restoration. Simply outsourcing our demand for land-based resources such as food and biofuels will only displace emissions elsewhere. Smart land use planning is essential to minimise these constraints. This should be carried out in partnership with all relevant stakeholders, including county and district councils, landowners, farmers, local communities, researchers and wildlife groups. The proposed new Local Nature Partnership would be the ideal forum for developing a low carbon land use strategy that achieves multiple benefits while minimising trade-offs, and this could build on the existing natural capital map of the county, but it is essential that it should be adequately resourced and funded, and supported through partnerships with researchers. Our analysis leads to several recommendations for land-use planning, including:

- Minimising the footprint of all new development by optimising housing density while also building in connected green and blue spaces. In typical urban extensions, housing densities of 60 dwellings per hectare should be possible with good design, use of mid-rise 3 and 4-storey dwellings, compact developments with a variety of services and amenities, and a shift away from private car ownership towards more active travel, public transport and shared car use to minimise land needed for car parking.[205] Much higher densities are possible in urban centres.

205 For example, the Essex Design Guide mandates densities of 75 dph for 'Compact' developments and 65 dph for 'Large sustainable developments'

- Reducing the need for car travel and new road links by siting new developments close to existing or potential high quality public transport links (including new rail stations where appropriate).[206] Supporting combined solar and agricultural ('aglectric') techniques to enable food production to continue within ground mounted solar farms
- Encouraging adoption of rooftop solar as far as possible.
- Preventing loss of high grade agricultural land (grade 1, 2 and 3a) to development.
- Encouraging dietary change to reduce meat and dairy consumption to 25% of current values, in order to free up farmland for carbon sequestration and habitat restoration. Councils and businesses can lead the way in their own food procurement (whilst still catering for those who require low fibre diets for health reasons).
- Supporting ambitious energy demand reduction measures to reduce the need for negative emission technologies such as BECCS, which have a very high land requirement for biofuel feedstock. Due to constraints on total land area, our scenarios produce only around 20% of Oxfordshire's share of the UK's biofuel feedstocks based on land area or population (which would require between 37–56% of the county's land), leaving the rest to be provided by imports. This could have significant implications for emissions and biodiversity overseas, as biofuel production could displace land needed for food production and lead to indirect deforestation.
- Well designed nature-based solutions including restoration of native woodland, floodplain meadows, chalk grassland, scrub, heath, wetland and ponds will bring both carbon sequestration and a vast range of other benefits including flood and erosion protection, air and water quality improvement, local cooling, habitat for pollinators and other wildlife, and pleasant spaces for recreation and interaction with nature. However these benefits require good planning, working closely with the proposed Local Nature Partnership and local communities to ensure that the right habitats are created in the right place and for the right purpose.
- The emerging Local Nature Partnership must be fully funded and supported (included through research partnerships) to engage stakeholders in the development of a Local Natural Capital Plan that meets zero carbon and biodiversity targets, while optimising co-benefits and minimising trade-offs for climate adaptation, health and other goals.
- It was not possible to analyse the sustainability of Oxfordshire's food system within the scope of this report but this is an important area for future work.

206 Transport for New Homes (2018), Project summary recommendations.

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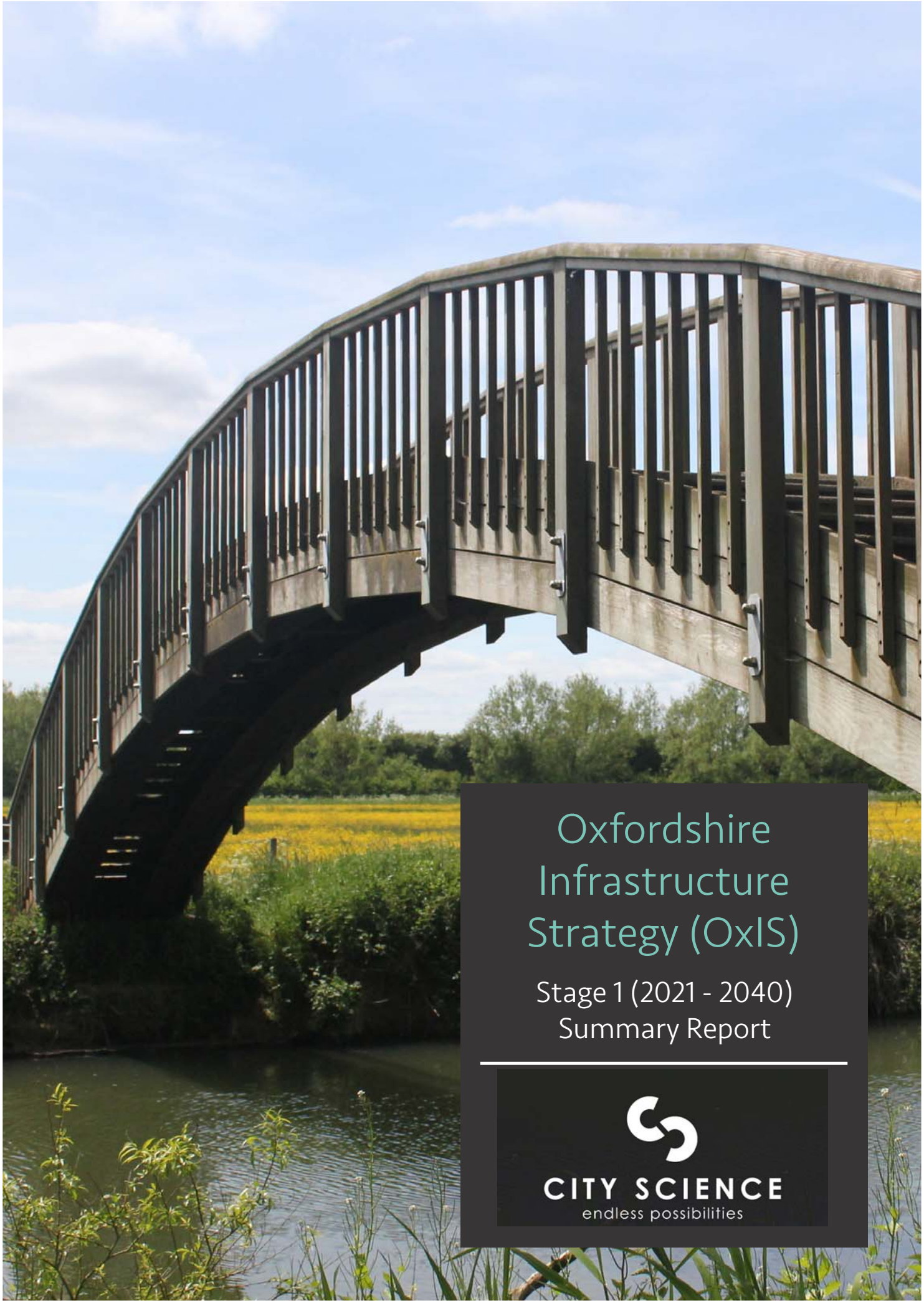
**Appendix CL2.27**

**Oxfordshire Infrastructure Strategy (Stage 1 Report, 2021)**



# Oxfordshire Infrastructure Strategy (OxIS)

Stage 1 (2021 - 2040)
Summary Report

CITY SCIENCE
endless possibilities

## DATE ISSUED: 12/07/2021

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| Elliot Reid & Simon Lusby | 0.1 | Summary Report – First Draft |
| Jo Muncaster | 0.2 | Update for Infrastructure Advisory Group |
| Elliot Reid & Simon Lusby | 1.0 | Summary Report – Final Draft for Consultation |
| Elliot Reid and Jo Muncaster | 1.1 | Summary Report - Final for Consultation |

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# 1. Stage 1 - Summary Report Introduction

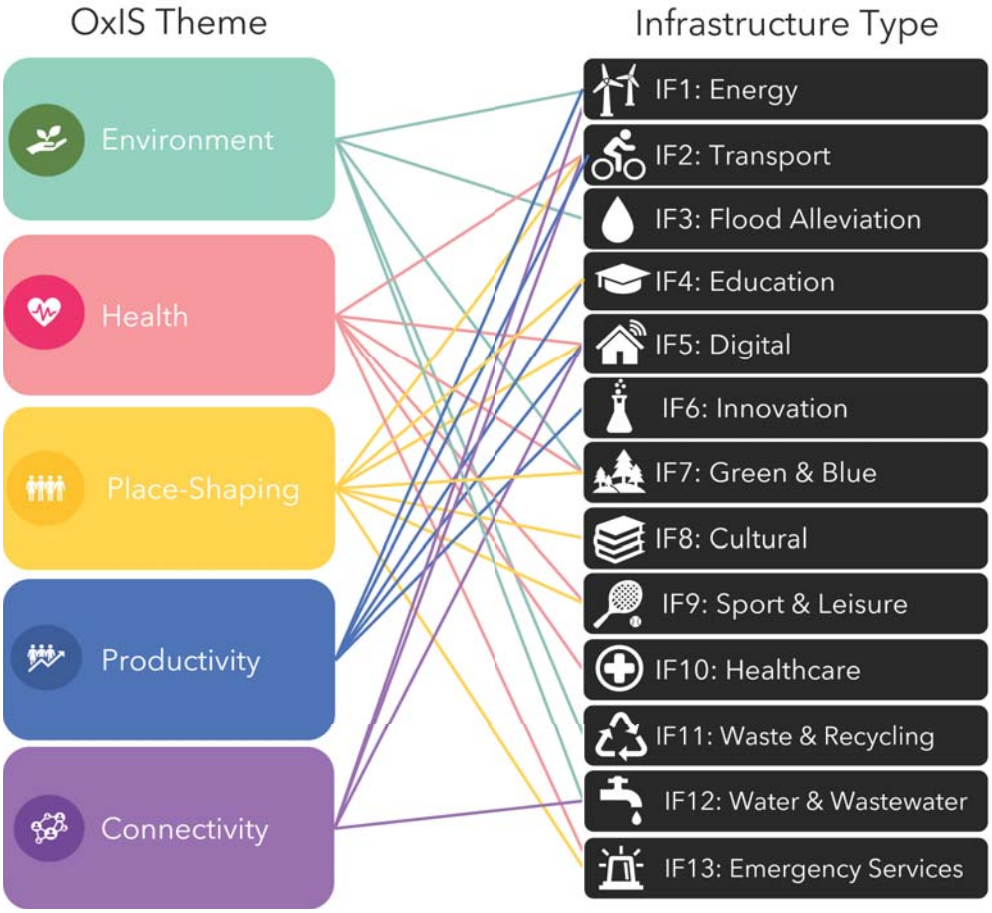
## 1.1 CONTEXT

This updated Oxfordshire Infrastructure Strategy (OxIS) was commissioned on behalf of the Oxfordshire Growth Board, to support the emerging Oxfordshire Plan 2050. This OxIS Stage 1 Report provides a strategic framework for Oxfordshire County Council (OCC), Oxfordshire's five District Councils and key strategic partners to prioritise currently proposed infrastructure scheme investment aligned to the five OxIS themes as well as identify potential delivery and funding opportunities to 2040.

This report will be followed by the OxIS Stage 2 Report in 2022 that will consider new proposals for strategic infrastructure required to meet Oxfordshire's needs in the period to 2050. The OxIS Stage 2 Report will be aligned with the Oxfordshire Plan 2050, which is a forthcoming Joint Statutory Spatial Plan identifying key areas where sustainable housing and employment growth can occur to 2050 and which will underpin the next iteration of Oxfordshire's District Local Plans.

OxIS aims to:

- Set out the priority strategic infrastructure investment needed to support sustainable, clean, healthy and inclusive growth in Oxfordshire, reflective of the ambition to build a global business innovation ecosystem and aligned to the five OxIS Themes
- Continue to shape and influence investment strategies at a national, sub-national and local level; maximising the efficiency and effectiveness of existing infrastructure and reducing the demand for new infrastructure, supporting Oxfordshre's role as a global innovation hub
- Plan for infrastructure over a longer-term horizon to complement and provide evidence to support the emerging Oxfordshire Plan 2050
- Provide an investment prioritisation that can be applied as relevant funding sources become available

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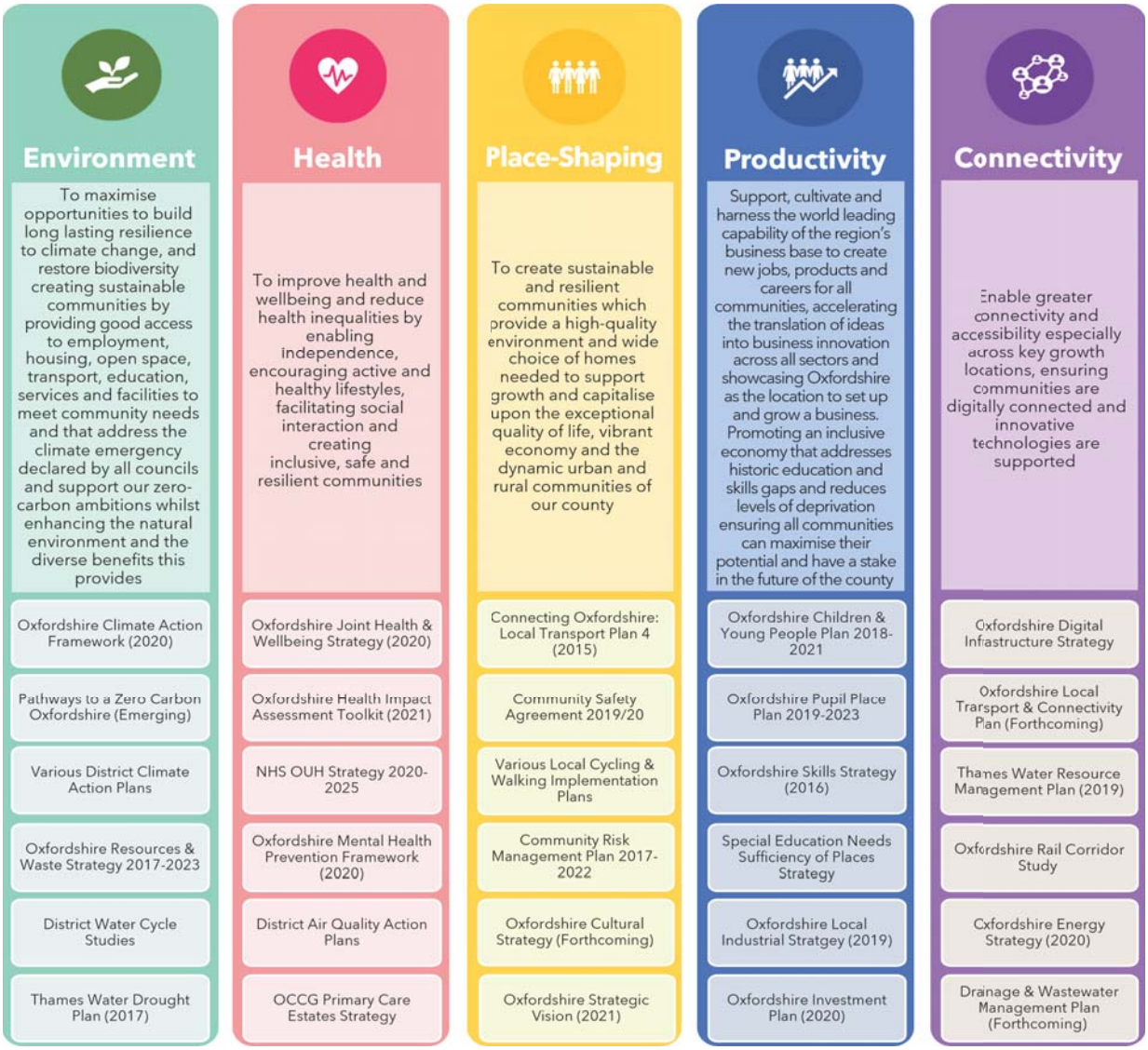
## 1.2 OxIS THEMES

The Oxfordshire Growth Board, in partnership with the six Oxfordshire local authorities and key strategic partners, have agreed five OxIS Themes. These themes are consistent with established and emerging policies across Oxfordshire, including Oxfordshire's Strategic Vision for Long Term Sustainable Development (2021) and the Local Transport & Connectivity Plan.

The purpose of the five OxIS Themes is to provide a structural framework for the identification of future infrastructure needs to 2040 to support sustainable, clean, healthy and inclusive growth in Oxfordshire. Six policy documents are provided as examples against each OxIS Theme.

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## 1.3 OxIS STAGE 1 & STAGE 2 SCOPE

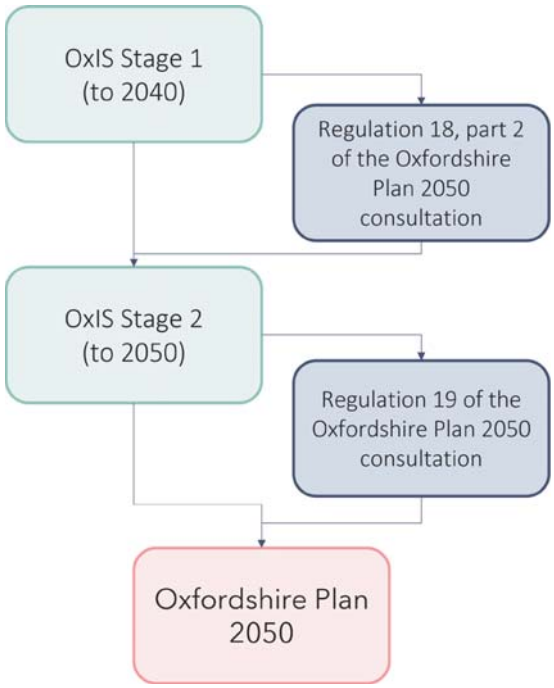
This deliverable (comprised of both this Summary Report and the Technical Report) constitutes the OxIS Stage 1 Report (aligning with Regulation 18, part 2 of the Oxfordshire Plan consultation). It is formed of a short OxIS Stage 1 Summary Report and a longer OxIS Stage 1 Technical Report.

It seeks to:

- Conduct a refresh of the evidence base and a re-prioritisation of strategic infrastructure schemes to 2040
- Align with the current forecasts of District Local Plans, where possible
- Embed a 'needs-based approach' to the multi-criteria appraisal aligned to the five OxIS Themes and 13 infrastructure types
- Considers infrastructure schemes identified within existing strategy documents such as District Local Plans and Infrastructure Delivery Plans (IDPs)
- Support, but not replicate District IDPs
- Support and champion the Oxfordshire Local Industrial Strategy and Investment Plan
- Establish a consensus, on strategic infrastructure schemes
- Support opportunities to facilitate strategic funding

This Report will be followed by an OxIS Stage 2 Report, which will:

- Consider strategic infrastructure required to meet Oxfordshire's needs to 2050
- Form a core part of the evidence base underpinning the Oxfordshire Plan 2050
- Align with Regulation 19 of the Oxfordshire Plan 2050 consultation
- Apply a broadly similar appraisal approach adopted in the Stage 1 Report
- Identify and rank new strategic infrastructure requirements emerging from the Oxfordshire Plan 2050 growth options
- Reflect outcomes of the Oxfordshire Plan 2050 consultation process




### Oxfordshire Plan 2050

This is a forthcoming Joint Statutory Spatial Plan which is a requirement of the Oxfordshire Housing and Growth Deal. The Plan will identify key areas where sustainable housing and employment growth can occur. It will be used as the foundation for the subsequent preparation of future District Local Plans.

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## 1.4 OxIS STAGE 1 SUMMARY REPORT & TECHNICAL REPORT

This OxIS Stage 1 Summary Report provides a high-level outline of the broader OxIS Stage 1 Technical Report. The Technical Report covers the following in detail.

Outlines background and purpose of this Stage 1 Report

Sets out key stakeholders

Provides context of the previous work in 2017

Outlines the scope, themes and structure of this OxIS Stage 1 Report

**1 Background**

Contextually reviews the places people live across the County

Identifies key data including age and economic demographics

Introduces the OxIS spatial framework and place-based approach

**2 Oxfordshire's People & Places**

Outlines the most recent County forecasts of population and employment growth to 2040, based on available information provided by Oxfordshire Local Authorities

**3 Oxfordshire's Future Change Trajectory to 2040**

Outlines Oxfordshire's existing infrastructure context across 13 infrastructure types

Indicates stakeholder responsibilities, infrastructure locational context and capacity

**4 Oxfordshire's Existing Infrastructure**

Identifies and summarises Oxfordshire's future needs to 2040 across the five OxIS Themes and 25 Sub-Themes

Outlines the strategic policy needs and level of importance (sourced from key national, County and District policies)

**5 Oxfordshire's Future Needs to 2040**

Outlines the methodology for the identification, sifting, grouping and filtering of OxIS infrastructure schemes

Identifies strategic gaps (absence or lack of tangible infrastructure schemes) to address future needs to 2040

**6 OxIS Infrastructure Scheme Identification & Gaps**

Introduces the bespoke multi-criteria appraisal approach for assessing the OxIS schemes

Sets out scoring logic maps

Outlines needs based and growth-based scoring elements

Provides an outcome for each OxIS scheme

**7 Multi-Criteria OxIS Scheme Appraisal**

Identifies the total scheme cost alongside the funding gap

Outlines potential funding sources to address the gap

**8 Scheme Funding & Deliverability**

Provides an overarching conclusion to the Stage 1 Report

Introduces the next steps that will be pursued in the OxIS Stage 2 Report to 2050

**9 Conclusions & Next Steps**

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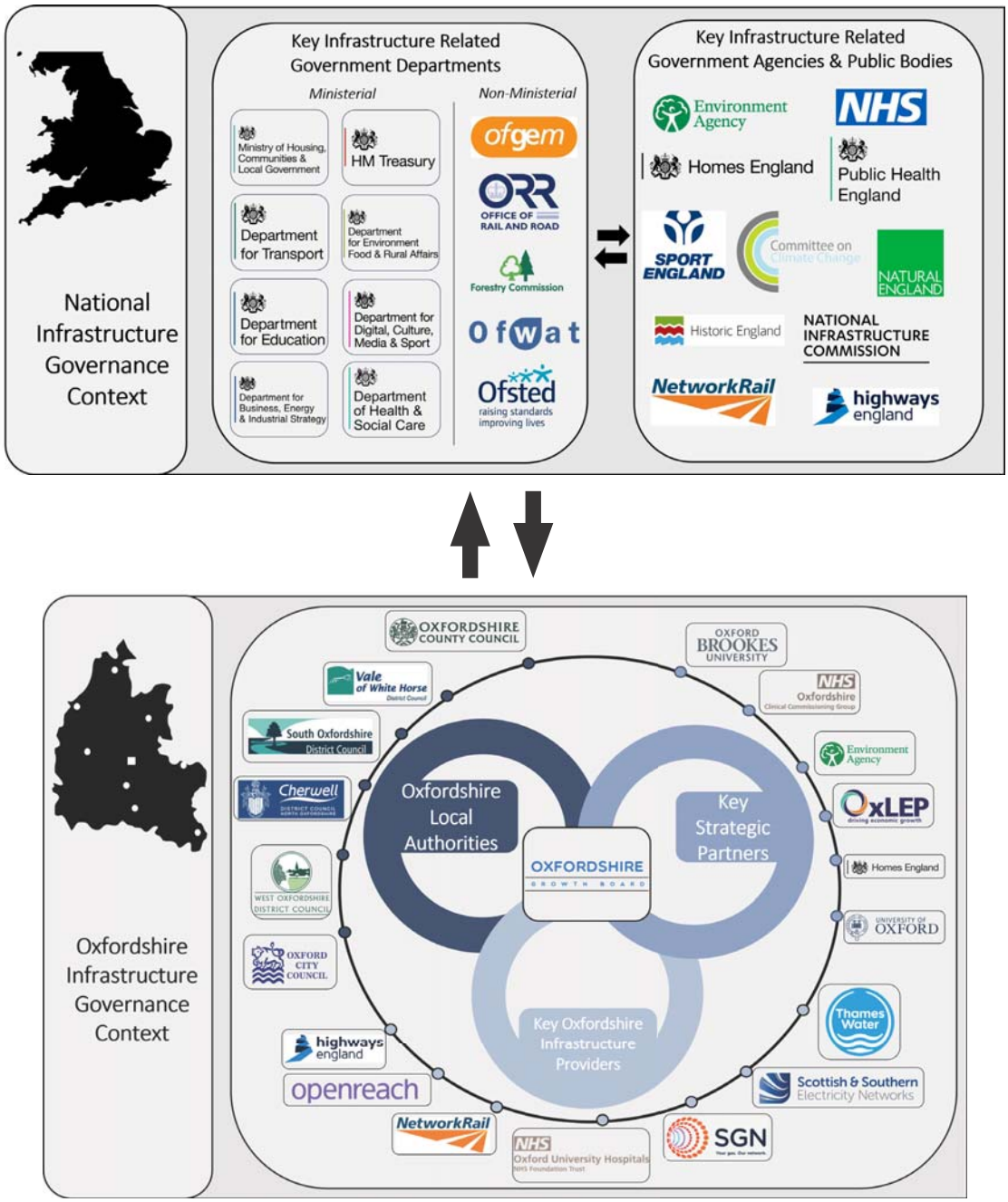
## 1.5 EXISTING OXFORDSHIRE INFRASTRUCTURE GOVERNANCE CONTEXT

Given its importance to achieving multiple goals, responsibility for the identification of infrastructure need, planning and delivery in Oxfordshire is multi-tiered across National, County and District governments. This broad governance structure reflects the collaborative relationship within Oxfordshire, between the Oxfordshire Growth Board and OCC, Oxfordshire's five District Councils, key infrastructure providers and key strategic partners . The Oxfordshire Growth Board has a key co-ordination role across these stakeholders including:

- Coordinating local efforts to manage economic, housing and infrastructure development in a way that is inclusive and maximises local social and environmental benefits
- Supports the development of local planning policy that meets the UK Government's stated aim of net zero carbon by 2050 and contributes towards biodiversity gain
- Seeks to secure funding in the pursuit of these aims

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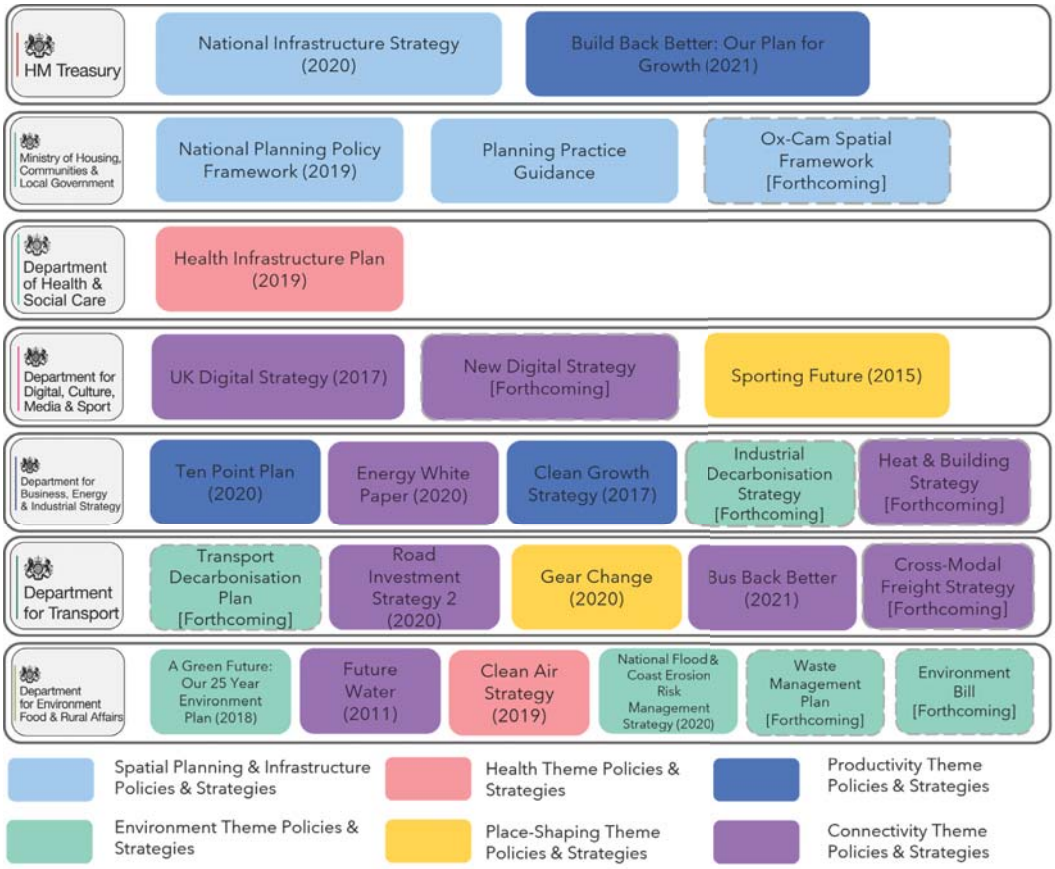
## 1.6 POLICY REVIEW - KEY NATIONAL POLICY FRAMEWORK & LEGISLATION

The below provides an overview of national policies and strategies impacting the planning of infrastructure and land use, categorised by government department and OxIS Theme. This reflects the broad national policy framework which OxIS operates within and is summarised in the OxIS Stage 1 Technical Report.




Additionally, OxIS must follow key national legislation as well as local county and district policies.

- **Planning and Compulsory Purchase Act (2004):** Obligates local planning authorities to prepare Local Plans and accompanying IDPs
- **Planning Act (2008):** Decision making framework for nationally significant infrastructure projects
- **Climate Change Act (2008):** Obligates the UK to meet net zero carbon emissions by 2050
- **Equalities Act (2010):** Obligates local authorities to provide services which eliminate discrimination
- **Environment Act (1995):** Obligates local authorities to monitor and manage air quality
- **Environmental Protection Act (1990):** Obligates local authorities to collect and treat waste appropriately
- **Care Act (2014):** Obligates local authorities to promote an effective provision of social care services
- **Education Act (1996):** Obligates local authorities to ensure that school education meets local demand
- **Road Traffic Act (1988):** Obligates highway authorities, like local authorities, to manage road safety
- **Transport Act (2000):** Obligates local transport authorities to provide suitable transport services and facilities

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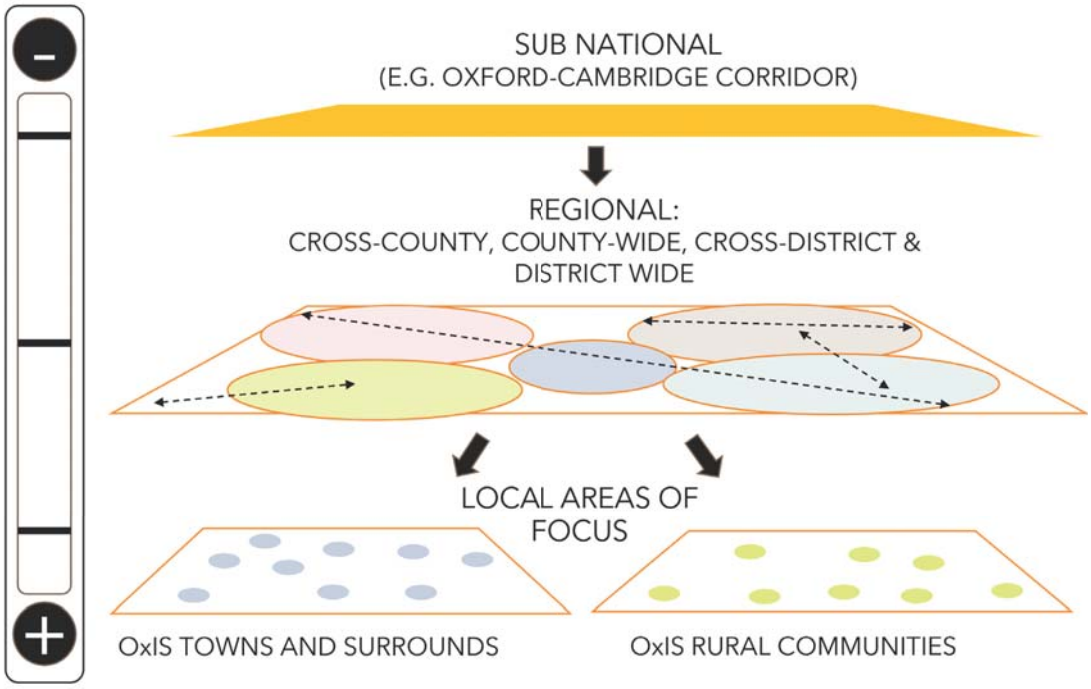
## 1.7 A PLACE-BASED APPROACH TO OxIS

The previous Oxfordshire Infrastructure Strategy completed in 2017 (OxIS-17) was underpinned by a spatial framework which reflected Regional, Countywide and Local Infrastructure. Local infrastructure was categorised into nine groups, with Oxford City being at the hub and the remaining eight groups forming corridor-based spokes to the edge of Oxfordshire. This approach has been reviewed as part of OxIS Stage 1 through discussions held as part of the OxIS Working Group, as well as in discussions with key stakeholders.

As with OxIS-17 , it is recognised that Oxfordshire's future needs and the nature of schemes vary according to the county's various spatial levels. OxIS complements the more detailed work at a District level and as such this work is not aimed to duplicate this but to collaboratively draw together the view across Oxfordshire. The three spatial groupings have thus broadly been retained, however, the local level has been adapted away from a corridor- to a place-based approach.

The use of this spatial framework forms a coherent thread throughout OxIS in relation to the identification of existing infrastructure, future needs, scheme identification and grouping and scheme appraisal.




| Spatial Level | Sub-Level | Description |
|---|---|---|
| **Sub-National** | Sub-National | Oxfordshire's needs and infrastructure schemes in the context of the wider area, including the South East and Oxford-Cambridge Arc. |
| **Regional** | Cross-County | Needs and schemes with a cross-county boundary importance or spatial impact |
| | County-wide | Needs and schemes with a county-wide importance or spatial impact |
| | Cross-District | Needs and schemes with a cross-district boundary importance or spatial impact |
| | District-wide | Needs and schemes with a district-wide importance or spatial impact |
| **Local** | OxIS Towns & Surrounds | Needs and schemes directly relevant to towns in Oxfordshire with notable projected future growth to 2040 (2040 to 2050 will be covered in Stage 2) |
| | OxIS Rural Communities | Needs and schemes directly relevant to rural communities, including villages and those in the rural-urban fringe, with notable projected future growth to 2040 |

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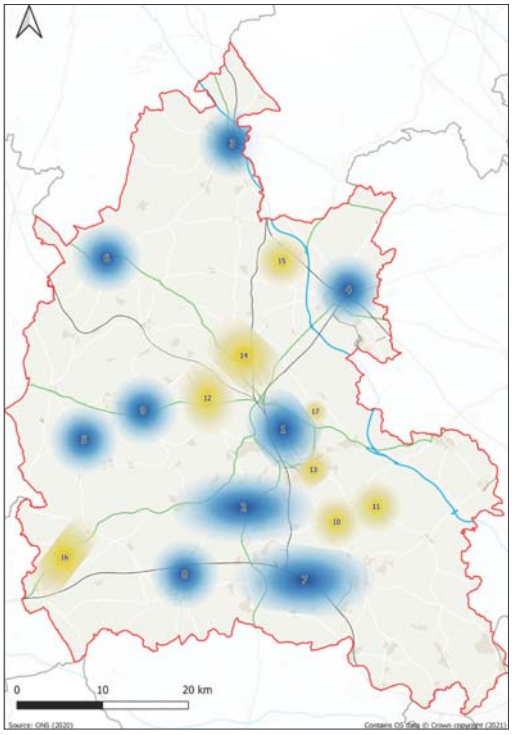
### 1.7.1 OxIS Local Areas of Focus

Place based local areas of focus have been introduced to replace the corridor-based approach of OxIS-17. This enables a greater consideration of schemes which may be lower in cost but remain strategically important to the creation of successful places. The benefits and practicalities of this approach include:

- **Direct Relationship with Growth:** Many of the identified OxIS schemes have a direct relationship to supporting growth. Local areas of focus allows the growth appraisal score to be applied objectively
- **Integration with District Local Plans:** The place-based approach is consistent with the spatial frameworks identified with the various District Local Plans and IDPs
- **Correlates with Place & People Approach:** It aligns with the reorientated priorities of the Oxfordshire Growth Board for growth delivery in a healthy, sustainable, and inclusive way
- **Relationship to Decarbonisation:** Research for the Royal Town Planning Institute identifies that place-based solutions are critical to achieving net zero carbon emissions, particularly from transport
- **Links to Potential Funding Opportunities:** Place-based schemes have a clearer link to potential funding opportunities; particularly in relation to their interaction with supporting growth
- **Community Integration by Active Travel:** The extents of the place based local areas of focus has been informed by an evidence base of cycling distance between places

The five District Council Local Plans take a sustainable approach to allocate growth to Oxford, other Market towns and larger villages across the county. Consideration of this spatial distribution has also highlighted a need to consider the different characteristics of these places given there are different requirements and priorities for infrastructure need. The OxIS place based local area of focus recognises this context have therefore been split into:

- **OxIS Towns & Surrounds:** Established urban areas comprising Oxford City and key towns where notable levels of change are forecast to 2040
- **OxIS Rural Communities:** Rural communities across Oxfordshire constituting both villages and urban-rural fringes where notable levels of change are forecast to 2040




OxIS Towns & Surrounds:
1. Oxford City
2. Abingdon & Surrounds
3. Banbury
4. Bicester
5. Carterton
6. Chipping Norton
7. Didcot & Wallingford
8. Wantage & Grove
9. Witney

OxIS Rural Communities:
10. Berinsfield
11. Chalgrove
12. Eynsham & Long Hanborough
13. Grenoble Road & Northfield
14. South Cherwell area & Woodstock
15. Upper Heyford
16. Faringdon & Shrivenham
17. Bayswater Brook

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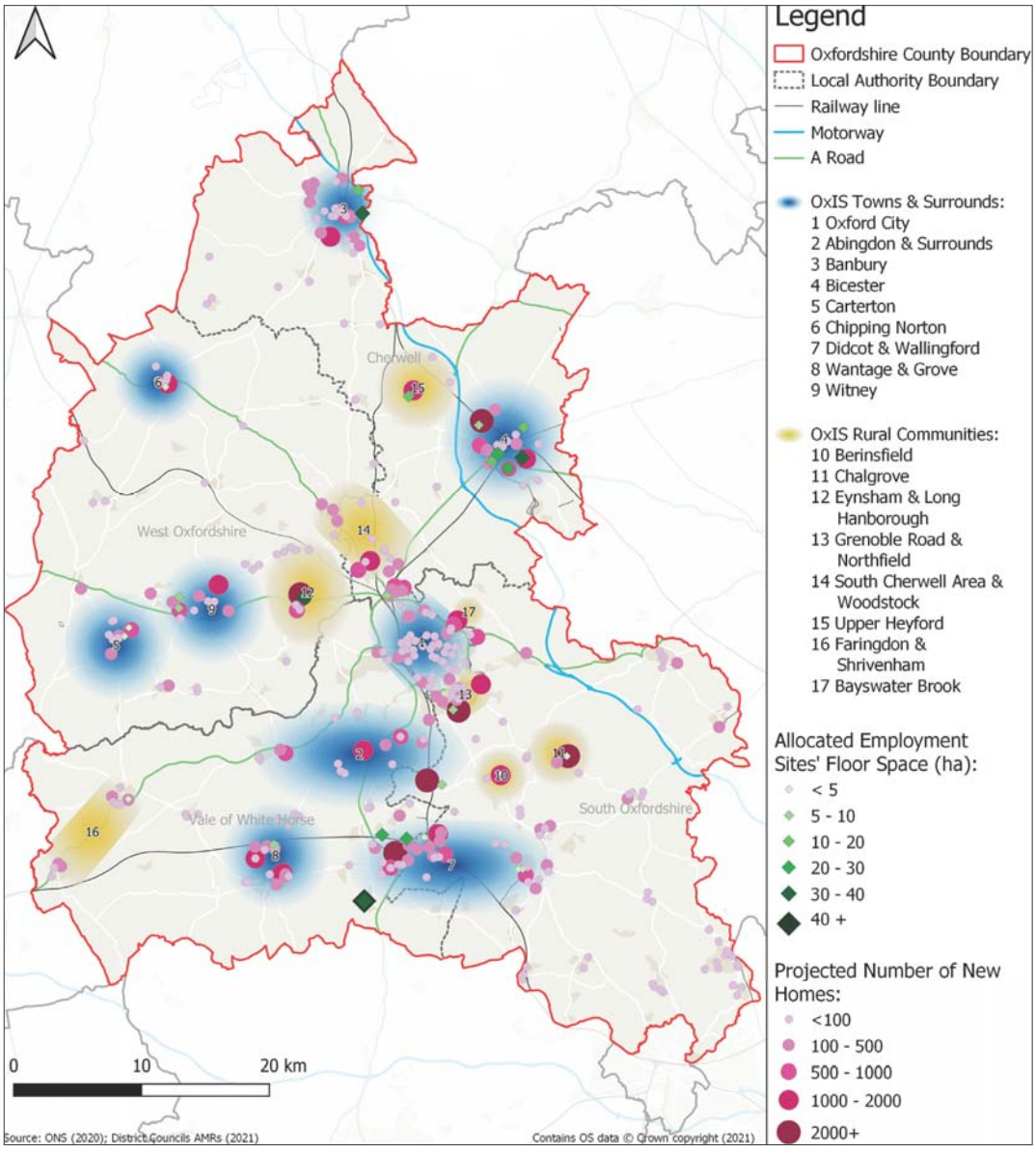
# 2. Future Change Trajectory

## 2.1 CHANGE TRAJECTORY TO 2040 (OxIS STAGE 1)

The OxIS Stage 1 Technical Report provides an indication of the key policy changes that have occurred since OxIS-17, including the Oxfordshire Housing and Growth Deal, adoption of District Local Plans and the emerging Oxfordshire Plan 2050, as well as the emerging Oxford-Cambridge Spatial Framework. Growth to 2050 will be captured in the forthcoming OxIS Stage 2 Report.
Through use of up-to-date information provided by Oxfordshire District Councils, it projects the future housing, employment, and population growth to 2040. To reflect the uncertainty of the period after the Local Plan horizons, this considers:

- **Core Local Plan Period:** 2020 – 2031 / 2035 / 2036
- **Horizon Planning Period:** 2031 / 2035 / 2036 – 2040

The population estimates to 2031 and 2040 are necessary to inform the county's future infrastructure needs both during the **Core Planning Period** and the **Horizon Planning Period** to 2040. This is applicable to infrastructure types that are predominantly demand driven such as Education, Potable Water, Waste and Health and Adult Social Care.

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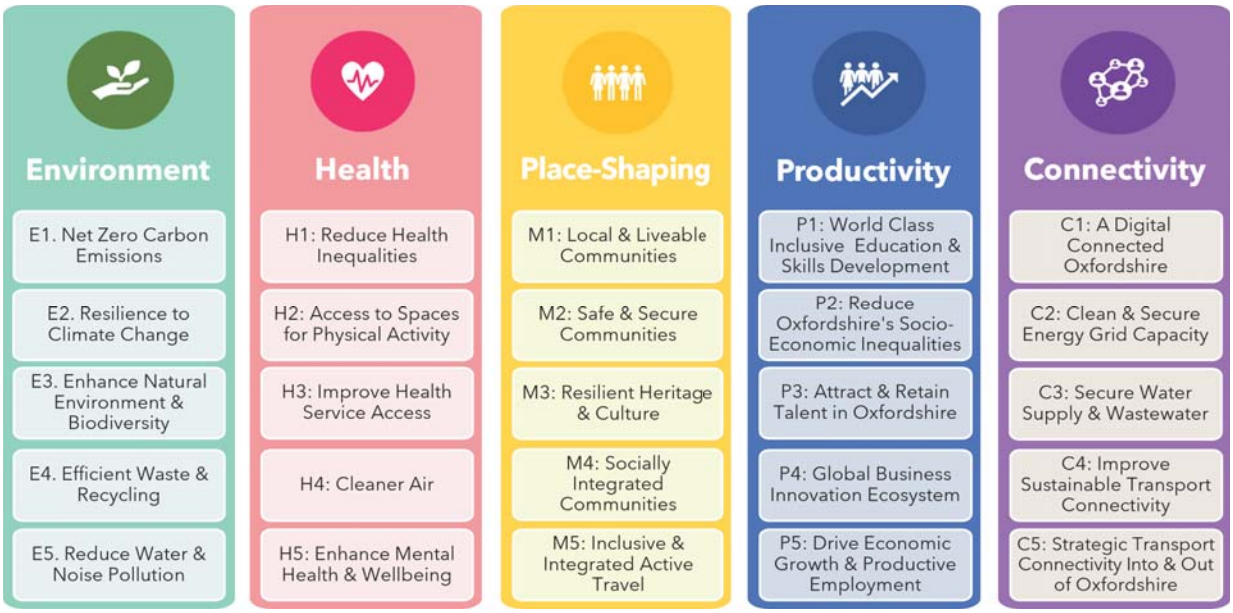
# 3. Strategic 2040 Needs

Through a robust evidence gathering process, including thorough engagement with multidisciplinary stakeholders, a review of key policies and strategies and a detailed analysis of the geospatial evidence base, these themes have been used as a framework to refine 25 outcome-led Sub-Themes. These Sub-Themes represent Oxfordshire's future needs for infrastructure investment to 2040 and underpin the needs-based appraisal component of the infrastructure scheme multi-criteria appraisal (see Chapter 7 of the OxIS Stage 1 Technical Report).




## 3.1 THEMATIC STAKEHOLDER WORKSHOPS

A series of thematic workshops and targeted engagement forums were held with key subject matter stakeholders and infrastructure providers to verify and refine the future needs to 2040 as well as to agree the core measurable outcomes.

| OxIS Theme | Workshop Topic | Workshop Attendees | |
|---|---|---|---|
| Environment | Environment | • Council Climate Action Teams<br>• Environment Agency | • Council Natural Environment Teams<br>• County Flooding Team |
| | Waste & Recycling | • OCC Waste Disposal Team | • District Waste Collection Teams |
| Health | Health | • Oxford University Hospitals NHS Foundation Trust<br>• Healthwatch Oxfordshire<br>• OCC Active Travel Team | • Oxfordshire Clinical Comissioning Group (OCCG)<br>• Healthy Place-Shaping Team<br>• Sport England<br>• Active Oxfordshire |
| Place-Shaping | Place-Shaping | • OCC Cultural & Community Team<br>• Communities First Oxfordshire<br>• OCC Healthy Place-Shaping Team | • OCC Community Safety Team<br>• OCC Road Safety Team<br>• OCC Active Travel Team |
| Productivity | Business Productivity | • OxLEP | • OCC Economic Development Team |
| | School Education | • County School Team | |
| Connectivity | Digital Connectivity | • County Digital Infrastructure & Strategy Team<br>• Openreach | • Virgin Media<br>• Zzoomm<br>• Airband |
| | Energy Connectivity | • County Energy Team<br>• Scotia Gas Networks (SGN) | • Scottish & Southern Elecricity Networks (SSEN)<br>• Western Power Distribution |
| | Water Connectivity | • Thames Water | |
| | Transport Connectivity | • OCC Transport Team<br>• Stagecoach West<br>• Network Rail | • Oxford Bus Company<br>• Great Western Rail<br>• Chiltern Railways |

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## 3.2 ENVIRONMENT NEEDS TO 2040

The Environment theme responds to the climate emergency declared by OCC and the five District Councils, as well as the net zero carbon targets identified in the various Climate Action Frameworks and by the Oxfordshire Growth Board. Through building resilience to the long-term effects of climate change, it also considers wider needs such as nature recovery alongside defending against flooding and ensuring sufficient waste disposal to support the creation of sustainable communities. Needs to 2050 will be covered in the forthcoming OxIS Stage 2 Report.

| | |
|---|---|
| **E1: Net Zero Carbon Emissions** | There is a strategic need to fulfil national legal obligations and the County-wide Climate Action Framework to achieve net zero carbon emissions in Oxfordshire by 2050, and the more recent Oxfordshire Growth Board target identified within Oxfordshire's Strategic Vision for net zero by 2040. There is also a need to achieve the carbon neutral target years, ranging from 2030 to 2050, identified in the five Oxfordshire District Council climate action strategies. The carbon emission inventory indicates a need to reduce emissions particularly reducing road transport tailpipe emissions (46% of total emission) and Oxfordshire's energy network emissions to 2040.<br>This includes urgently reducing carbon emissions within Cherwell and South Oxfordshire to enable their ambitions to achieve net zero carbon emissions by 2030. Primarily due to the presence of the M40, emissions originating in these Districts comprise the largest proportion (30% and 20% respectively) of total County emissions. |
| **E2: Resilience to Climate Change** | The Met Office forecasts that the impacts of climate change will result in warmer temperatures and drier periods in summer and an increase in the frequency of extreme weather events including heavy periods of rainfall in winter by 2040. A series of national strategies, including the Climate Change Risk Assessment and the Environment Agency's National Framework for Water Resources identify this as a strategic need to plan resilient infrastructure which can cope with these additional pressures. This includes ensuring infrastructure can reduce flooding risk to communities and managing the impact of warmer drier periods on the public water supply and people's health.<br>From various Strategic Flood Risk Assessments and Water Cycle Studies produced by Oxfordshire's Local Authorities, the greatest need to improve resilience to flooding events is within Oxford, where around 16.5% of properties are situated within Flood Zone 2 or 3. Both the Vale of White Horse and South Oxfordshire also have a higher fluvial flooding risk than the rest of the county due to the presence of the River Thames. |
| **E3: Enhance Natural Environment & Biodiversity** | The UK Government's 25 Year Environment Plan (2018) identifies a need for a Nature Recovery Network rich in wildlife and biodiversity through the creation or restoration of 500,000 additional hectares of wildlife-rich habitat outside of protected sites by 2042. This sets the tone for the emerging Environment Bill (2020) which proposes to establish a mandatory requirement for biodiversity net gain and to embed connected Nature Recovery Networks.<br>Oxfordshire's Nature Recovery Network has recently been drafted by a partnership of local environmental stakeholders led by Wild Oxfordshire with local authority input, under the direction of the Biodiversity Advisory Group, athough is yet to be agreed. The work establishes three recovery zones, with the overarching aim to create connected habitats and fulfil the wider aspiration for doubling the area of land well-managed for nature in the county by 2050. There is a further need to protect Oxfordshire's established areas of rich landscape quality, including its three Areas of Outstanding Natural Beauty. |
| **E4: Efficient Waste & Recycling** | Oxfordshire's local authorities have a primary legal obligation to ensure continued safe and efficient waste collection and disposal services in accordance with the waste hierarchy. As identified in the Oxfordshire Resources and Waste Strategy, this is supported by fulfilling the strategic need to reduce household waste generation, increase the proportion which is recycled and embed more of a circular economy approach in the county, including a focus on reusing, repairing, and upcycling material and goods. This has shared benefits such as reducing carbon emissions.<br>In recent years, whilst waste sent to landfill/energy recovery has reduced despite population growth (attributed to the country-leading recycling rate), substantial future population growth by 2040 necessitates further infrastructure investment such as increased Waste Transfer capacity and a review of Household Waste Recycling Centre provision. |
| **E5: Reduce Water & Noise Pollution** | **Water:**The UK Government's 25 Year Environment Plan (2018) identifies the key national strategic need for 'clean and plentiful' water by 2042. This includes exceeding water quality objectives identified in the Thames River Basin Management Plan (DEFRA, 2015). This strategic need is also reflected in the Water Cycle Studies and Local Plans produced by Oxfordshire's Local Authorities. As identified in the Thames Water Pollution Incident Reduction Plan (2020), a key need is to reduce sewage outfall incidents in Oxfordshire by 30% by 2025. There is also a need to improve water quality and to reduce water pollution incidents.<br>**Noise:** The strategic need, identified in the Noise Policy Statement for England (DEFRA, 2010) and NPPF (MHCLG, 2019) focuses on limiting the impact of additional noise generated through new development sites and improving people's health and quality of life. The strategic need to reduce and manage noise levels through the local planning process in Oxfordshire is established in the Adopted Oxfordshire Minerals & Waste Core Strategy (OCC, 2011) and reflected in the Districts' Local Plans. There is a need to reduce noise in Oxford City given it has been designated by DEFRA as a noise agglomeration area whist there is also a need to reduce environmental noise levels on key transport corridors. |

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## 3.3 HEALTH NEEDS TO 2040

The Health theme is associated with reducing Oxfordshire's health inequalities and supporting people to lead more active and healthier lifestyles. Needs to 2050 will be covered in the forthcoming OxIS Stage 2 Report.

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|---|---|
| **H1: Reduce Health Inequalities** | Alongside a legal obligation, the strategic need to reduce health inequalities within Oxfordshire is set out within OCC's Joint Health and Wellbeing Strategy 2018 – 2023. This identifies a future need to shift the focus towards a more preventative approach to physical and mental health by addressing issues such as inequalities in opportunity or outcomes alongside inequalities in relation to health service access. This strategic need is also reflected within the Oxfordshire's Strategic Vision, Local Plans as well as the five District Council's Corporate Plans.<br>There is a need to address inequalities within specific urban areas, where healthy life expectancy can be less than 60 years of age. Many of these same places also rank in the 10% of the most health-deprived areas in the UK according to the Index of Multiple Deprivation. Most of the health-deprived places with Oxfordshire lie adjacent to areas identified for future growth which provides a future opportunity for infrastructure investment to address. |
| **H2: Access to Spaces for Physical Activity** | The need to improve physical activity rates is identified in a suite of national policies which identify physical inactivity as detrimental to physical and mental health. In an Oxfordshire context, the strategic need for improved access to spaces for physical activity is reflected within the Local Transport Plan (LTP4) (OCC, 2015), the Joint Health & Wellbeing Strategy (Oxfordshire Health & Wellbeing Board, 2019) and the Rights of Way Management Plan (OCC, 2014).<br>Evidence collected by Sport England's Active Lives Survey (Sport England, 2020) identifies a need to increase physical activity levels within Oxfordshire's urban areas, particularly in more deprived communities. This includes building physical activity into people's everyday routines by investing in infrastructure such as dedicated sport and leisure facilities as well as high quality walking and cycling routes. |
| **H3: Improve Health Service Access** | The NHS Long Term Plan (2019) and the Health Infrastructure Plan (2019) identify the long-term strategic need for an integrated approach to the NHS service model across primary, community and social care to prioritise 'out of hospital care'.<br>The Joint Health & Wellbeing Strategy (Oxfordshire Health & Wellbeing Board, 2019) identifies the strategic need to tackle inequalities of accessing healthcare services given the underlying challenge that some people in Oxfordshire face of being unable to get to or use services. The Oxfordshire Primary Care Estates Strategy (OCCG, 2021) identifies a need to ensure resilient and accessible primary care services which reduce current pressure and can meet future demand.<br>Alongside the Care Act (2014), the Market Position Statement (OCC, 2019) identifies a need to meet future demand from Oxfordshire's ageing population through additional supply in extra care housing and care homes. Housing-based population projections also indicate there may be an additional 42,000 people aged 75 and over living in Oxfordshire by 2040. This triggers a need for around 1,700 additional extra care housing units and almost 3,000 care home beds.<br>There is a need to enhance the infrastructure so that primary care working with community health and social care can offer more locally integrated services and to enhance capacity and infrastructure of primary care throughout Oxfordshire. |
| **H4: Cleaner Air** | The strategic need for cleaner air in Oxfordshire relates to a national legal obligation which identifies legal limits for air quality. These limits relate to Nitrogen Dioxide ($NO_2$) and Particulate Matter (PM), comprising of both PM10 and PM2 .5, which are the most harmful pollutants to health. The Clean Air Strategy 2019 (DEFRA, 2019) identifies the strategic need at a national level to fulfil these legal obligations rapidly, through achieving a 73% reduction in oxides of nitrogen ($NO_x$) emissions and a 46% reduction in $PM_{2.5}$ by 2030.<br>Despite recent improvements, there is a strategic need to revoke Oxfordshire's 13 Air Quality Management Areas as soon as possible by ensuring that $NO_2$ emissions, primarily caused by road transport, are reduced below legal limits. The most pressing need to invest in infrastructure, such as sustainable transport, to achieve cleaner air is within OxIS Towns and Surrounds with annual $NO_2$ emissions above legal limits, such as Banbury. |
| **H5: Enhance Mental Health & Wellbeing** | The 2011 Mental Health Strategy alongside Public Health England's Prevention Concordat for Better Mental Health (PHE, 2020) identifies the strategic need to improve people's mental health at a national level. This emphasises the need to take a prevention-focused approach, impacting on the wider determinants of mental health and well-being, and increasing the impact on reducing health inequalities.<br>Oxfordshire's Strategic Vision (Oxfordshire Growth Board, 2021) identifies the need for happier, healthier and inclusive communities with a focus on prevention and healthy place-making for all. This is underpinned by a range of strategies including the Oxfordshire Mental Health Prevention Framework 2020 – 2023 (Mental Health Prevention Concordat Partnership Group, 2020) which identifies a need to address wider social determinants of mental health and the differences in opportunities for people. The evidence indicates that there is a need to reduce levels of depression across Oxfordshire, with data identifying that around 12% of people over 18 have been diagnosed with depression in 2019/2020, which is marginally higher than the national average. Prevalence rates are also higher for GP surgeries in some OxIS Towns & Surrounds alongside the rural communities of Kidlington and Berinsfield. |

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## 3.4 PLACE-SHAPING NEEDS TO 2040

The Place-Shaping theme is associated with the creation of sustainable and resilient communities which provide a high-quality environment, reflecting the urban and rural dynamics of Oxfordshire. Needs to 2050 will be covered in the forthcoming OxIS Stage 2 Report.

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|---|---|
| **PS1: Local & Liveable Communities** | The need to create local and liveable communities is set out in both local and national planning policy to ensure communities are safe and healthy. The need for easy access to social, recreational and cultural facilities is also highlighted and encouraging reduced travel or a shift to travel by sustainable transport through providing key services and facilities within local reach of residents.<br><br>In Oxfordshire, large rural parts of the county, particularly across Vale of White Horse and South Oxfordshire, are defined by Indices of Multiple Deprivation as being in the top 10% deprived Lower-layer Super Output Areas associated with barriers to housing and services. With new development coming forward, careful planning and place-shaping is required to adhere to policy by creating liveable, local communities with access to local amenities and sustainable transport. |
| **PS2: Safe & Secure Communities** | Although the perception of crime given the context nationally is diminished, crime has been rising in Oxfordshire and with population growth predicted, measures need to be put in place now to minimise the risk to people's safety. Measures set out by Safer Oxfordshire Partnership, highlights the importance for infrastructure and the heathy place-shaping of communities to prevent crime. Theft and violence represent 80% of crimes in Oxfordshire and urban areas have proportionally higher levels of crime than the county's rural areas. This is further supported by Indices of Multiple Deprivation data, showing that Oxfordshire is home to a number of top 10% deprived areas (e.g. parts of Oxford, Banbury and Bicester) in England and Wales associated with crime, identifying a stronger need.<br><br>Analysis of road safety, identifies a need to address the number of road collision casualties county-wide in Oxfordshire, particularly around urban areas with evidence suggesting walking and cycling issues are present. |
| **PS3: Resilient Heritage & Culture** | **Heritage:** As identified in the Historic England Corporate Plan (Historic England, 2020), Oxfordshire's Strategic Vision (OCC, 2020), NPPF (MHCLG, 2019) and the Oxfordshire Districts' Local Plans, there is a strategic need to protect and conserve the county's rich and varied heritage assets both from future development as well as the threats of climate change. Evidence from the Heritage at Risk Register (Historic England, 2020) indicates that there are 30 heritage sites in Oxfordshire at risk.<br><br>**Culture:** The Arts Council Ten 2020 – 2030 Strategy (Arts Council England, 2020) identifies the strategic need from a national perspective to improve community access to high-quality cultural experiences. This is complemented locally by Oxfordshire's Strategic Vision (OCC, 2020) and Arts & Culture Strategic Framework (OxLEP, 2019) which identify a strategic need for enhanced and more inclusive arts and cultural spaces across Oxfordshire.<br><br>The emerging Strategic Framework for OCC Libraries & Heritage Services (OCC, 2021) emphasises the need for such services to address increased demand from population growth, while Active Lives Survey (Arts Council England, 2018) and the Taking Part Survey (DCMS, 2020) indicate a need to improve use of public library services in specific parts of Oxfordshire. Data at a national level also suggests there may be a need to enhance cultural participation rates amongst lower socio-economic groups, those with disabilities and amongst the Black, Asian and Minority Ethnic community. |
| **PS4: Socially Integrated Places** | The need to maintain social interaction between people in communities helps fight loneliness and provides support networks, especially for people at vulnerable points. This is reflected in national Government policy which focuses on healthy place-shaping and connecting people through transport and digital infrastructure. With new developments planned, it is even more important that considerations are made to improve social cohesion through preventative measures in the county.<br><br>Loneliness is a well-established health risk and is associated with poor health and well-being. In Oxfordshire, pockets throughout the county (e.g. Didcot Park, parts of Oxford City and around Banbury) demonstrate high risks of loneliness; which has increased as a result of the COVID-19. There is an immediate need to address this, particularly in Vale of White Horse, Cherwell and Oxford City, where rates are highest. There is a need for investment in green space as this is proven to encourage social interaction and bring people together. |
| **PS5: Inclusive & Integrated Active Travel** | National policy ambitions demonstrate the strong need to reduce private vehicle journeys and replace these with walking and cycling journeys, to support several initiatives including reducing carbon emissions, tackling congestion and enhancing people's mental health and wellbeing. This is followed up by local policy at both a County and District level as, although active modal share in Oxfordshire, notably in Oxford, is good compared to the national picture, national and local targets are ambitious and require a step-change in behaviour.<br><br>There is good potential for further cycling take-up in Oxford, South Cherwell, Abingdon, Carterton, Bicester and Wallingford with delivery of the right cycling infrastructure whilst investment in the Rights of Way Network can support greater active travel in more rural areas. The needs link to previous sections as active travel relies on local & liveable and safe & secure communities to encourage and support walking and cycling journeys. |

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## 3.5 PRODUCTIVITY NEEDS TO 2040

The Productivity theme is associated with supporting increased economic productivity within Oxfordshire, considering the needs of both citizens and business. Needs to 2050 will be covered in the forthcoming OxIS Stage 2 Report.

| | |
|---|---|
| **P1: World Class Inclusive Education & Skills Development** | There is a statutory future need for Local Authorities, like OCC, to ensure every school-age child and young person can access suitable education, as well as sufficient early-years education and childcare provision for all children of four years and under. Oxfordshire's Pupil Place Plan 2019 – 2023 (OCC, 2019), which assesses the suitability of provision to meet future demand, identifies a strategic need for OCC to continue to offer a high percentage of parents a place at their first choice school. Future population projections indicate there is likely to be around an additional 12,000 primary school places and 10,500 secondary school places required by 2040.<br><br>The Special Educational Needs & Disabilities Sufficiency of Places Strategy (Oxford City Council, 2018), identifies a strategic need to address the deficit of OCC school places and to reduce the reliance on 'out of county' provision and reliance on Independent providers. Future population projections indicate there may be a need for additional capacity for around 450 children with Special Educational Needs & Disabilities by 2040.<br><br>Build Back Better (HM Treasury, 2021) alongside the White Paper 'Skills for Jobs' identifies a strategic need to upskill people to ensure employers' needs are met in the future and to guarantee a strong COVID-19 recovery. Oxfordshire's strategy, including the emerging OxLEP Local Skills Report and Plan (2021) as well as Oxfordshire's Economic Recovery Plan (OxLEP, 2021), identifies a productivity need to ensure provision of post-16 training and education. |
| **P2: Reduce Oxfordshire's Socio-Economic Inequalities** | Although most metrics indicate Oxfordshire has a high-performing economy, it is not delivering for everybody – as evidenced by a geographic disparity in Indices of Multiple Deprivation. The pockets of high deprivation occur in every district, but the most pressing need is in parts of south Oxford City, Banbury, and Bicester.<br><br>There is need for highly targeted interventions to maximise impact for these communities. Forecasts of future inequality are difficult to make because the COVID-19 pandemic has disrupted pre-existing economic trends. Prior to the pandemic, housing affordability problems within the county were a key indicator of socio-economic inequality. However, in the short-term, the pandemic has only exacerbated this and also driven up youth unemployment – reducing this is another key need.<br><br>The aim to reduce socio-economic inequality is included in policies at both the County and District level within Oxfordshire, and is considered across multiple themes (e.g. climate action and industrial strategy). This interconnectedness to other aims, and across branches of government, gives rise to the need for a coordinated approach in order to maximise effectiveness. It should be noted that whilst the national Levelling Up Fund (HM Treasury, 2021) is currently available for regenerative infrastructure projects, all District Councils within Oxfordshire have been given the lowest priority to receive funds. |
| **P3: Attract & Retain Talent in Oxfordshire** | The Oxfordshire Local Industrial Strategy (OxLEP, 2019) has identified the scarcity of affordable housing as a key barrier to attracting and retaining talent. This is to the detriment of productivity targets and contributes to socio-economic inequalities within the county. As such, there is a pressing need to provide a greater quantity of affordable housing.<br><br>Based on a review of evidence, the price of houses relative to earnings is greater in all districts of Oxfordshire than the English average – indicating poor housing affordability. The need is greatest in Oxford City which is the least affordable UK city for housing. This need in part, can be delivered by the 100,000 new homes planned within the Oxfordshire Housing & Growth Deal by 2031 (Oxfordshire Housing and Growth Deal, 2017). |
| **P4: Build A Global Business Innovation Ecosystem** | Oxfordshire's Local Industrial Strategy (OxLEP, 2019) plans to build upon the world-leading science and technology clusters within the county and position it as one of the top three global innovation ecosystems by 2040. There is a strong business case for the 2040 target, with forecasts estimating the return as an additional £23bn in Gross Value Added to the economy and 108,000 new jobs.<br><br>Critical to success will be ensuring that Oxfordshire provides citizens with a sustainable and affordable high quality of life. This will support the attraction and retention of the necessary world-class talent, and the skills development of existing citizens in order to fulfil the business needs. There is also a need to nurture key industries by providing the infrastructure they need to thrive, including transportation, business accommodation, and support services. |
| **P5: Drive Economic Growth & Productive Employment** | Economic growth and greater productive employment can raise the living standards of Oxfordshire's citizens, and is intertwined with many of the other themes within OxIS. For greatest overall success, there is a need for economic growth to support and be supported by other strategic goals. For example, the need to reduce socio-economic inequality or move towards a 'green economy'. Fortunately, this is recognised in national policy and Oxfordshire's Local Industrial Strategy (OxLEP, 2019) - which plans develop the county's economy as a knowledge-based innovation ecosystem by 2040.<br><br>Some forecasts predict that Oxfordshire's economy might increase £20bn by 2040, despite the COVID-19 pandemic (Cambridge Econometrics, 2021). However, to realise the potential, it will be critical for County and District Council investments to target promoting greater productive employment. |

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## 3.6 CONNECTIVITY NEEDS TO 2040

The Connectivity theme is associated with ensuring that communities, particularly locations identified for growth, across Oxfordshire are connected both digitally and from a transport perspective as well as with wider utilities including clean and secure energy and water supply. Needs to 2050 will be covered in the OxIS Stage 2 Report.

| | |
|---|---|
| **C1: A Digitally Connected Oxfordshire** | There is national focus on full-fibre connectivity and 5G mobile data and policy sets out the need to provide full coverage of full-fibre by 2033 to support economic growth, social connectivity and rural communities, alongside providing 4G to 95% of the country. These ambitions are mirrored in the Oxfordshire Digital Infrastructure Strategy (OCC, 2020), aligning with the need to facilitate productive economic growth and employment as well as supporting the delivery of more efficient cultural and health and social care and services and playing its part in replacing road journeys.<br><br>Oxfordshire currently only has 16.5% of its county covered by full-fibre broadband, behind proportional figures for the region and the nation (thinkbroadband, 2021). Alongside addressing these existing coverage gaps, particularly in Oxford City, there is a further need to increase the roll-out of full fibre to keep pace with the increased future growth over this period to 2033 of approximately 74,000 homes. There is a particular need to address coverage gaps in Bicester, Wantage & Grove, Grenoble Road, Northfield, Abingdon, Berinsfield and Upper Heyford. |
| **C2: Clean Energy Supply Grid Capacity & Connectivity** | The Government's Ten Point Plan for a Green Industrial Revolution sets the ambition for the UK's net zero carbon target for 2050 by minimising energy demand and moving away from fossil fuels. The Oxfordshire Energy Strategy (OxLEP, 2019) further establishes a need for a clean, modern and smart energy system as well as a need for flexibility in infrastructure planning to better align demand and local renewable supply.<br><br>Energy consumption analysis by District shows relatively consistent levels as well as consistent fuel type proportions over the past ten years, with bioenergy and wastes only partially replacing other traditional fuel sources. Oxfordshire's reliance on petroleum products and gas must reduce at a fast rate to meet national 2030 targets and clean energy goals. This need is exacerbated by the population growth expected in the county. Electricity consumption has, however, shown a reduction between 2008 and 2019 in all Districts showing efficiency gains. However, alongside population growth, other factors will result in a need to address electricity consumption (e.g. transition to electric vehicles and decarbonisation of heat). Targets for electric vehicle use raise specific concerns over the requirements for large scale investment in the electrical grid and network infrastructure. |
| **C3: Secure Water Supply & Wastewater** | Along with the unpredictability of water supply due to climate change, Oxfordshire's growing population and environment concerns around the pressure being placed on rivers and groundwater, there is an ever-increasing need to predict and manage the demand and supply of potable water to support growth in the region. This is why Thames Water has forecast a supply demand deficit in the Swindon & Oxfordshire Water Resource Zoneby 2023. This need to reduce the deficit can be addressed through targeted infrastructure to support water efficiency, smart meters, reusing treated wastewater and carrying out water transfers. In terms of wastewater, there is a need for targeted infrastructure investment, such as in the proximity of Carterton, to address current sewage outflow events to improve local water quality and support biodiversity restoration (see E2 and E5). Future population growth will further impact the efficiency of wastewater infrastructure and areas of high growth (e.g. Banbury, Bicester and Oxford) require wastewater treatment plant sites to be upgraded. |
| **C4: Improve Sustainable Transport Connectivity Across Oxfordshire** | The Government's priorities for transport are underpinned by the need to achieve net zero carbon emissions by 2050, reflected in a myriad of emerging national and county strategies. They are directly relevant to Oxfordshire and these needs are met in county- and district-wide policy, identifying measures such as space reallocation, better, integrated, high-quality public transport and managing demand .<br><br>Although the rise in electric vehicles will tackle transport carbon emissions, it will not tackle the county's congestion or wider health & place-shaping needs. For most Oxfordshire residents, the car is the first choice; particularly in rural areas. With Oxfordshire's predicted substantial growth in both housing and employment, transport connectivity plays a vital role. For these needs to be met, whilst contributing to decarbonisation efforts, sustainable transport has a significant role to play. To deliver the need of improved sustainable transport connectivity across Oxfordshire requires a significant enhancement in public transport service reliability and connectivity between OxIS Towns & Surrounds. |
| **C5: Strategic Transport Connectivity into & out of Oxfordshire** | England's Economic Heartland's Transport Strategy identifies the ambition for people and businesses to be connected through the region and with international gateways, to support local economic growth, harness the globally renowned centres of innovation and improve the quality of life of its residents. Together with LTP4 (OCC, 2015), they identify the need to improve Oxfordshire's public transport access with key destinations (e.g. London), transport interchanges (e.g. Heathrow) and key settlements (e.g. Birmingham and Reading). Currently many public transport journeys suffer from long travel times, delays from traffic congestion and multiple connections, further contributing to the use of private car for strategic journeys. There is a specific need to improve rail and road freight travel; demand is forecast to grow and Oxfordshire is key as it hosts a number of significant freight routes such as from the Port of Southampton to the Midlands. |

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# 4. Strategic Infrastructure Schemes

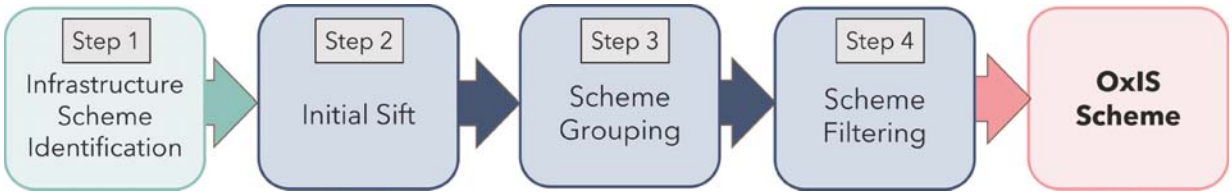
A robust four-stage identification, sifting, grouping and filtering process has been applied, to capture those schemes which are 'strategic' infrastructure. With no existing national or local definition of 'strategic' infrastructure, a broad definition has been applied to select not only schemes with a significant spatial impact but also smaller scale schemes which remain strategically critical to the creation of successful places.

## 4.1 IDENTIFICATION OF STRATEGIC INFRASTRUCTURE SCHEMES

The objective identification of schemes has considered a wide breadth of sources reflecting the Oxfordshire Growth Board's strategic ambitions: to achieve growth in a sustainable, clean, healthy and inclusive way aligned to the five OxIS Themes. Therefore, schemes have been considered which are required to deliver District growth aspirations and fulfil Oxfordshire County's needs to 2040.

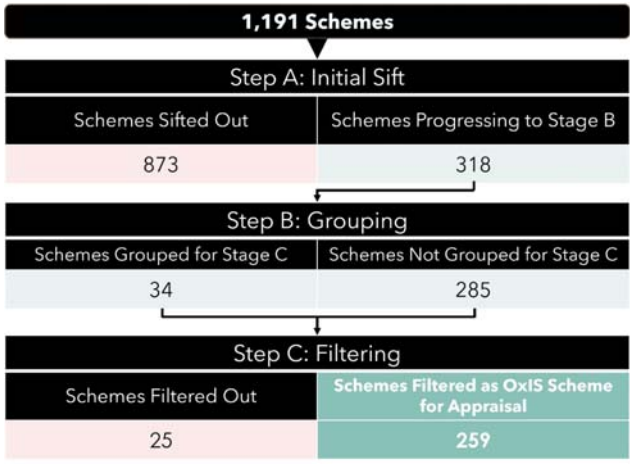
A broad definition has been applied for OxIS which:

- Recognises key stakeholder's views and captures schemes with a significant geographical coverage, scale or capital cost
- Captures smaller scale schemes which remain strategically critical to success of places
- Accounts for the longer-term horizon of OxIS
- Excludes non-capital schemes, as well as those currently in delivery or advanced delivery stage
- All identified schemes have been subject to a robust three-stage sifting, grouping and filtering process to assesses their strategic context.




Key scheme sources include:

- District Infrastructure Delivery Plans & Infrastructure Funding Statements
- District Local Plans
- Oxfordshire Local Transport Plan 4 (Area & Corridor Strategies)
- Oxford Local Cycling & Walking Infrastructure Plan
- Oxfordshire Rail Corridor Study
- Thames Water Resource Management Plan
- Oxfordshire Investment Plan
- OCCG Primary Care Estates Strategy




### Context of Scheme Identification & Sources

It should be noted that this process considers infrastructure schemes that are already proposed in established sources by key stakeholders across the county, rather than the devisal of new proposals. As a result, some of the schemes included within this Stage 1 Report predate significant policy shifts that have since occurred across the county (e.g. in relation to net zero carbon targets & Oxfordshire's Strategic Vision).

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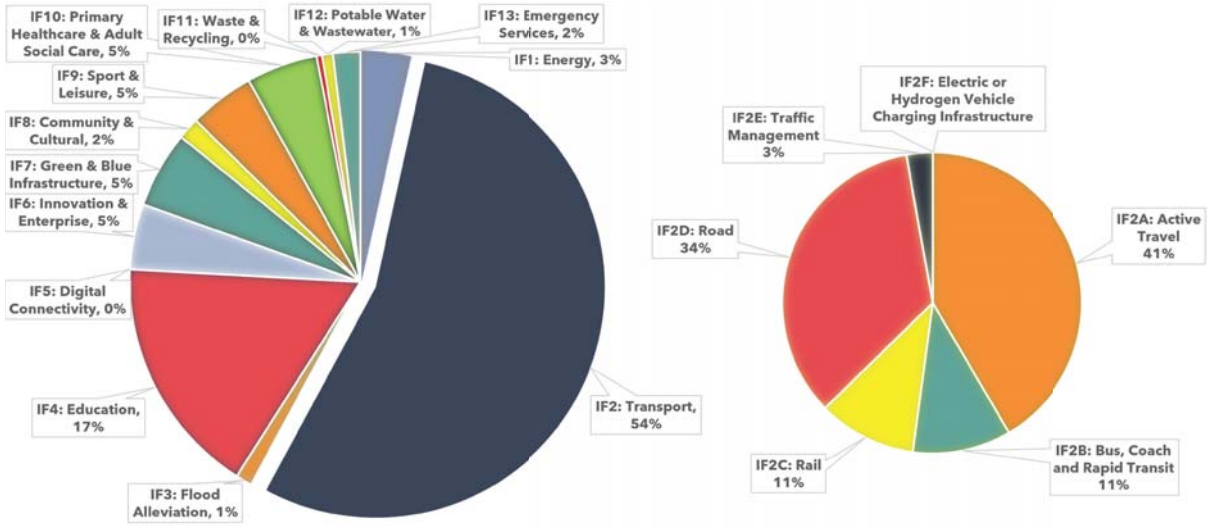
## 4.2 OxIS STRATEGIC INFRASTRUCTURE SCHEMES

The outcome of the sifting and filtering process resulted in the identification of 259 OxIS strategic infrastructure schemes qualifying to appraisal. Over half these schemes fall into the transport infrastructure type. Schemes across the remaining twelve categories are generally evenly distributed; except for Digital (IF5) where no schemes have been identified; due to the commercial nature in which digital infrastructure is delivered.




Around 30% of OxIS Stage 1 schemes have a regional spatial impact; varying from cross-county, county-wide, cross-district and district-wide schemes. The remaining schemes have a local spatial impact, split across the OxIS Towns & Surrounds (51%) and the OxIS Rural Communities (21%). The location of schemes is shown overleaf.

### Emerging Schemes Excluded from the Stage 1 Appraisal

The robust needs based multi-criteria appraisal methodology is reliant on schemes having a minimum level of known detail, such as features, strategic aims, location and likely capital cost, to provide a level of consistency in scoring outputs across differing scheme types. The Stage 1 Report has been produced at a specific point in time (June 2021) which means that there is varying level of detail available on scheme specifics. There are several schemes with a regional spatial impact where this level of detail is not yet known and remain subject to an ongoing optioneering process. This means appraisal of these schemes has not been possible. This includes the following schemes:

- **OAIDP1:** Third Thames Crossing north of Reading
- **SO42:** Western Rail Link to Heathrow Airport
- **SO43:** Great Western Railway Modernisation
- **SO85:** Abingdon Southern Bypass
- **SO86:** Southern Didcot Road
- **OC10:** A40 – A40 Strategic Link Road
- **WO90:** East Chipping Norton Link Road
- **SO87:** A4130 Road Corridor Capacity Improvements
- **EA1:** Abingdon Flood Alleviation Scheme
- **EA2:** Thames Valley Flood Alleviation Scheme
- **TWB1:** Southeast Strategic Reservoir
- **TWB2:** Oxford Canal Raw Water Transfer
- **STW1:** Severn to Thames Water Transfer

There is an opportunity through future updates of OxIS to consider these schemes further as more information becomes available.

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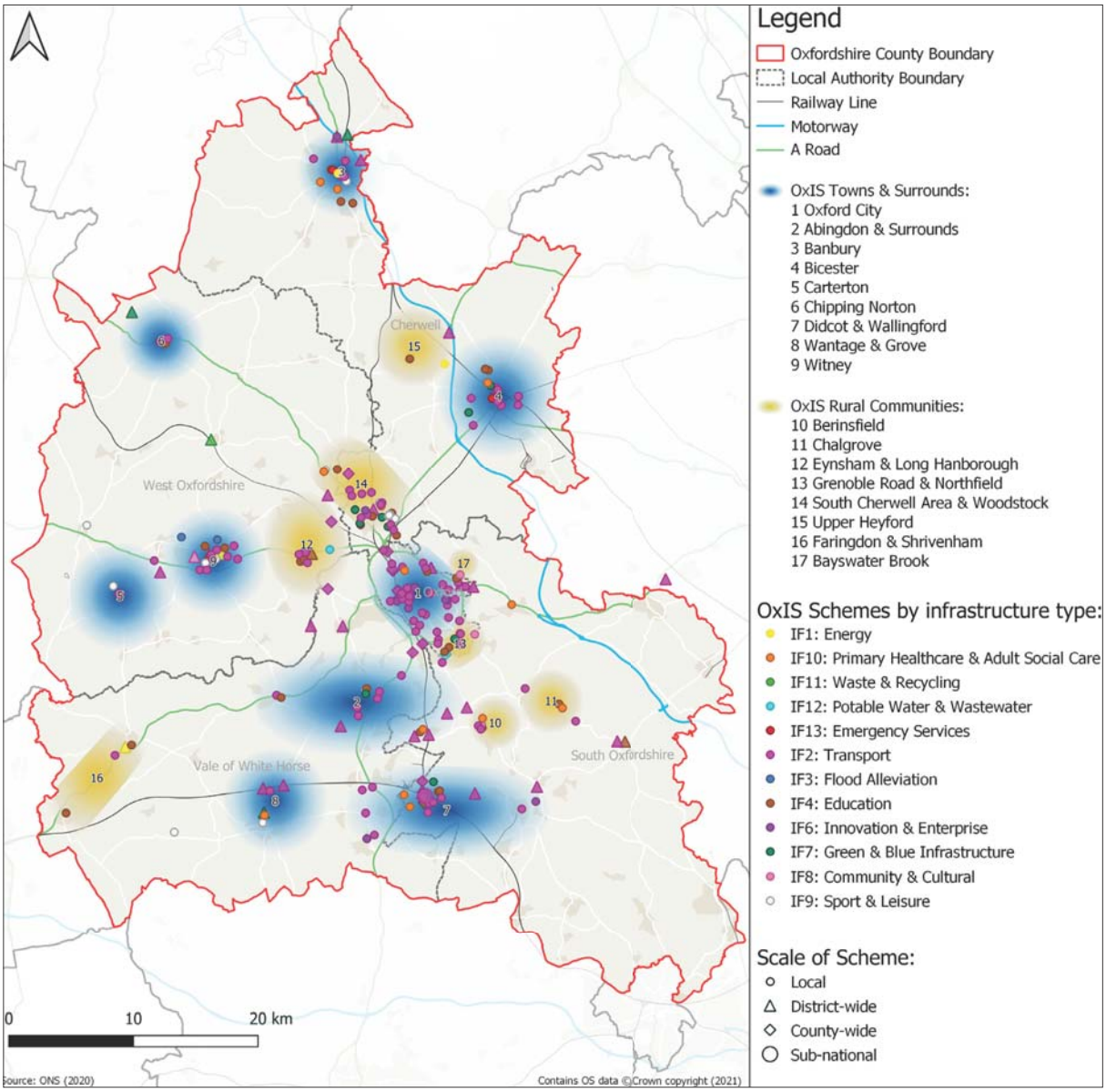


| Scale | Spatial Impact | Number of Schemes | Percentage of Schemes |
|---|---|---|---|
| **Regional** | Sub-National | 1 | 0% |
| | Cross-County | 1 | 0% |
| | County-Wide | 19 | 7% |
| | Cross-District | 21 | 8% |
| | District-Wide | 31 | 12% |
| **Local** | OxIS Towns & Surround | 132 | 51% |
| | OxIS Rural Community | 54 | 21% |
| | TOTAL | 259 | 100% |

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# 5. Outcome of OxIS Stage 1: Infrastructure Schemes

## 5.1 OxIS SCHEME GAPS - INFRASTRUCTURE PROVIDERS

The OxIS Stage 1 scheme list has some outstanding gaps associated with infrastructure that is the responsibility of key external infrastructure providers and utility providers including commercial digital infrastructure companies as well as the Environment Agency, Thames Water and SSEN. Extensive engagement with these stakeholders has been undertaken through the Stage 1 process, however, limited information has been provided on schemes that remain reliant on funding; some of which is a result of commercial sensitivities. This means that there is presently a lack of some of these related schemes considered within OxIS Stage 1.

## 5.2 OxIS SCHEME GAPS - UNMET NEEDS

A key finding of this work is that the identified OxIS schemes do not fully address Oxfordshire's needs to 2040 (see Chapter 5 of the OxIS Stage 1 Technical Report). These gaps are amplified by the challenge in engagement with infrastructure providers as well as policy and societal changes since District IDPs were prepared.

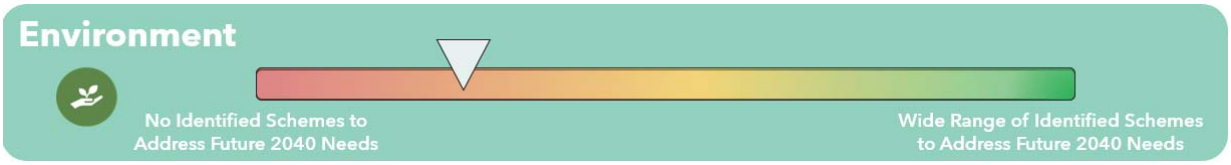
The below outlines unmet needs for each theme alongside recommended schemes that should be brought forward by key stakeholders to ensure these are met (see Section 6.5 of the OxIS Stage 1 Technical Report for further detail). Scheme gaps to address needs to 2050 will be covered in the forthcoming OxIS Stage 2 Report.

### 5.2.1 Environment Related Scheme Gaps

Many of Oxfordshire's plans and wider policy and strategy documents pre-date the declaration of a climate emergency in 2019 and the subsequent county-wide and district Climate Action Frameworks produced in 2020 and 2021. This recent shift in priorities means there is a substantial absence of schemes currently identified which specifically aim to reduce carbon emissions across the county, further highlighting the need for this updated and needs-based OxIS.

The National Infrastructure Commission Report (2020) identifies a critical need for future infrastructure schemes to reduce carbon emissions both from energy and transport sources (approximately 82% of Oxfordshire's carbon emissions ).

Around 30% of OxIS Stage 1 schemes have a regional spatial impact; varying from cross-county, county-wide, cross-district and district-wide schemes. The remaining schemes have a local spatial impact, split across the OxIS Towns & Surrounds (51%) and the OxIS Rural Communities (21%). The location of schemes is shown overleaf.




**Recommended Additional Future Schemes to Address Environment Needs to 2040**

**Home Energy Efficiency Retrofitting Schemes:** Domestic energy is responsible for 26% of Oxfordshire's carbon emissions. Aside from local authority funding through the Better Homes, Better Health support service and some ongoing schemes to retrofit Oxford City council housing stock, there are no other identified similar domestic retrofitting schemes . Schemes should differentiate between those who are fuel poor and need grant support and those need market / structural incentive.

**Zero Carbon Heat Network Schemes:** Gas networks currently heat over 240,000 of Oxfordshire's buildings whilst approximately 20% of buildings in Oxfordshire are off grid. It is critical to rapidly switch to zero carbon sources by retrofitting buildings, including the installation of heat pumps, or exploring

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alternative fuels. New gas connections should be phased out in accordance with the UK Government's upcoming strategy.

**Electric Vehicle Charging Schemes:** Emissions from road transport are responsible for 46% of Oxfordshire's total emission. The upcoming Transport Decarbonisation Plan and Oxfordshire Electric Vehicle Charging Infrastructure Strategy indicate the scale of charging infrastructure required, however, intervention is likely to be needed to ensure universal coverage across the county, particularly in rural areas.

**Zero Emission Zones:** There is an opportunity to utilise Oxford's emerging zero emission zone as a platform for wider scheme implementation across Oxfordshire's wider towns to promote modal shift and accelerate the transition to the use of electric vehicles.

**Freight Decarbonisation Hubs:** There is a need to identify schemes which support the rapid recharging of electric or hydrogen freight vehicles to ensure zero carbon goods deliveries.

**Zero Carbon Public Transport Schemes:** There is a need for future infrastructure schemes to enable zero carbon emissions from public transport ( e.g. through bus recharging facilities, use of solar power and rail electrification schemes). It is proposed that Oxford will be one of the first zero-emission bus areas in the UK, and once in place should be able to offer opportunities and lessons learnt for other towns in the country.

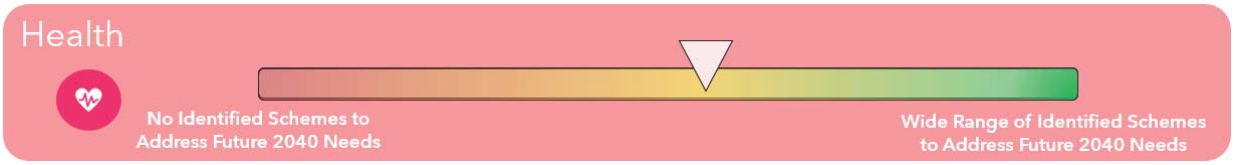
**Habitat & Biodiversity Restoration Schemes:** There are limited identified strategic schemes to fulfil Oxfordshire's need to achieve biodiversity net gain across the county. There is an opportunity through the emerging Oxfordshire Nature Recovery Strategy to identify schemes in the Nature Recovery Zone to enhance habitat restoration and to integrate this with wider infrastructure types such as flood alleviation and transport.

**Renewable Energy Schemes:** The electrical and gas networks account for 36% of all County carbon emissions. Analysis of the potential for renewable energy sources, is needed to set out a strategy to support zero carbon production and consumption as well as understanding the need for carbon offsetting and managing residual gaps .

**Waste Disposal Infrastructure:** There is a need for further waste disposal schemes to be identified such as Household Waste and Recycling Centres to fulfil future demands as a result of population growth.

### 5.2.2 Health Related Scheme Gaps

The identified schemes do not fully address Oxfordshire's needs for a more preventative approach to enhancing people's physical and mental health. In particular, the COVID-19 crisis has raised the profile of the role that access to green space and space for physical activity plays in addressing health inequalities and enhancing people's mental health and wellbeing.




**Recommended Additional Future Schemes to Address Environment Needs to 2040**

**Outdoor Green Space Schemes:** In some districts there is a lack of identified strategic outdoor green space schemes, such as parks, to address Oxfordshire's future need to improve people's physical activity levels, mental health and social integration. Preventative measures like this, which are now embedded in health policy and strategies, allow the opportunity to encourage healthy lifestyles and reduce health inequalities across Oxfordshire.

**Indoor and Outdoor Sport Schemes:** Some District Councils do not identify specific strategic indoor and outdoor sport and leisure schemes, such as swimming pools, sports halls and playing pitches, to address the future need to improve people's physical activity levels, and mental health. There is an opportunity for District Councils to identify strategic schemes as part of upcoming reviews.

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**Primary Healthcare Schemes:** The funding limitations of the OCCG the mean there is a lack of tangible GP and health centre schemes to address Oxfordshire's future need to ensure sufficient primary care access. There is an opportunity for greater partnership working and additional capital contributions to ensure that schemes are developed in line with trajectories of future site delivery.

**Social Care Schemes:** There is an absence of adult social care schemes currently identified to address Oxfordshire's future needs to accommodate for the ageing population.

*See also Zero Emission Zone Scheme Gap in Environment*

### 5.2.3 Place-Shaping Scheme Gaps

Whilst there are several identified schemes, such as active travel improvements, which address many of the place-shaping needs, there is lack of schemes intended to address Oxfordshire's needs to improve social cohesion and perception of crime occurring.

**Recommended Additional Future Schemes to Address Environment Needs to 2040**

**Community Safety Schemes:** There is a lack of schemes, such as public realm or area-wide lighting improvements, which are specifically intended to address Oxfordshire's need to improve community safety.

**Strategic Cycling Schemes:** Whilst there are several schemes associated with the emerging Local Cycling & Walking Implementation Plans to enhance active connectivity within the confines of some of Oxfordshire's towns and villages, there is a lack of identified schemes to strategically connect these communities together, particularly rural villages. Through partnership working between the Oxfordshire Local Authorities, there is an opportunity to develop an Oxfordshire-wide cycling network to ensure a more integrated approach .

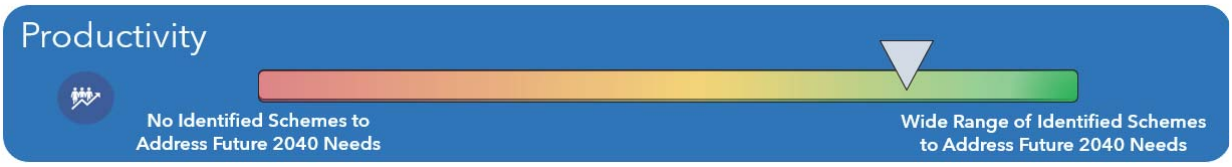
**Cycle Infrastructure in OxIS Rural Communities:** There are some established and future Local Cycling and Walking Infrastructure Plans in towns across the county, however, these should be completed for all OxIS Towns and Surrounds and OxIS Rural Communities, particularly in South Oxfordshire, to ensure suitable cycle infrastructure supporting growth is provided.

**Library & Arts Centre Schemes:** In anticipation of the upcoming OCC Cultural Strategy, there is currently a lack of identified cultural schemes, such as libraries and arts centres, to address Oxfordshire's future needs.

**Rural Community Hubs and Places to Meet:** The COVID-19 crisis has increased Oxfordshire's need to enhance social integration to reduce rising rates of loneliness. There is an opportunity to develop schemes, such as community hubs or public squares, which are specifically intended to improve social cohesion as well as provide alternative ways of providing key local services.

### 5.2.4 Productivity Related Scheme Gaps

Gaps to address the productivity needs are primarily associated with education schemes, concerning Special Educational Needs alongside adult education schemes. There is also an absence of schemes, such as community hubs or transport schemes, which are specifically intended to address Oxfordshire's socio-economic inequalities.

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**Recommended Additional Future Schemes to Address Environment Needs to 2040**

**Special Educational Needs Schemes:** There is a need for the development of schemes to alleviate the shortage of special school places by increasing capacity across the county.

**Adult Education Schemes:** The economic impacts of COVID-19 combined with the need to build a global innovation ecosystem, means there is a requirement for additional adult education schemes across Oxfordshire to upskill and retrain adults to align with the future workforce requirements.

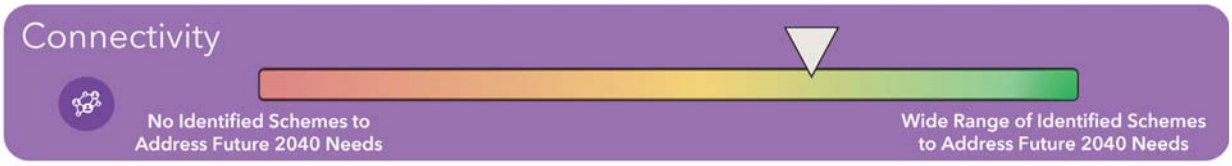
**Schemes Specifically Targeting Socio-Economic Inequalities:** There is a need for intervention schemes which address the need to reduce socio-economic inequalities (e.g. Blackbird Leys in Oxford, Ruscote in Banbury).

**Affordable Housing Schemes:** The delivery of approximately 70,000 new homes during the Core Local Plan Period will address the historic housing shortfall in Oxfordshire, however, it is essential that a considerable proportion of these homes are truly affordable to fulfil the need to attract and retain talent in the county.

**Rural Business Hubs:** Supporting greater self-containment and liveability of rural communities through provision of hubs with the ability to support small business growth.

### 5.2.4 Connectivity Related Scheme Gaps

There are significant shortcomings in the existing digital infrastructure, particularly in urban areas. This has been amplified by the recent spike in home working and shopping, as well as significant global uptake in digital technology. Other needs are highlighted by the recent National Bus Strategy, which requires the development of a Bus Service Improvement Plan to set out the county's plan for improving bus services for passengers.




**Recommended Additional Future Schemes to Address Environment Needs to 2040**

**Non-Commercial Full Fibre Broadband Schemes:** Oxfordshire currently only has 16.5% of its county covered by full-fibre broadband, behind proportional figures for the region and the nation. The commercial sensitivity of the private sector means that the identification of future schemes which are not commercially viable is not yet possible.

**Digital Upgrade of Public Assets:** The onset of 5G and the Internet of Things means there is an opportunity for further schemes to be identified (e.g. digitalisation of street furniture)

**Electricity Supply Grid Capacity Schemes:** There is currently an absence of tangible strategic schemes identified by Oxfordshire's Distribution Network Operators (DNOs) to address the combined challenge of additional grid demand placed by future housing growth in the county alongside increasing electric vehicle charging infrastructure.

**Wastewater Schemes:** There is a lack of strategic schemes currently identified to ensure that the need for sufficient wastewater processing capacity across Oxfordshire continues to be met in the context of future population growth. Partnership working with Thames Water is required to identify any forthcoming schemes. Wastewater schemes that are fully funded by Thames Water are excluded from scheme appraisal.

**Bus Priority Schemes:** Quality bus services have an important role in providing regional sustainable connectivity, as well as achieving net zero transport emissions, socially integrating places, driving economic growth, reducing socio-economic inequalities, improving access to health service and spaces for physical activity and providing inclusive access to education.

**Rapid Transit Schemes:** Similar to bus priority, rapid transit schemes in the form of quality bus, tram or rail services are internationally recognised to provide multiple benefits to address key OxIS Needs.

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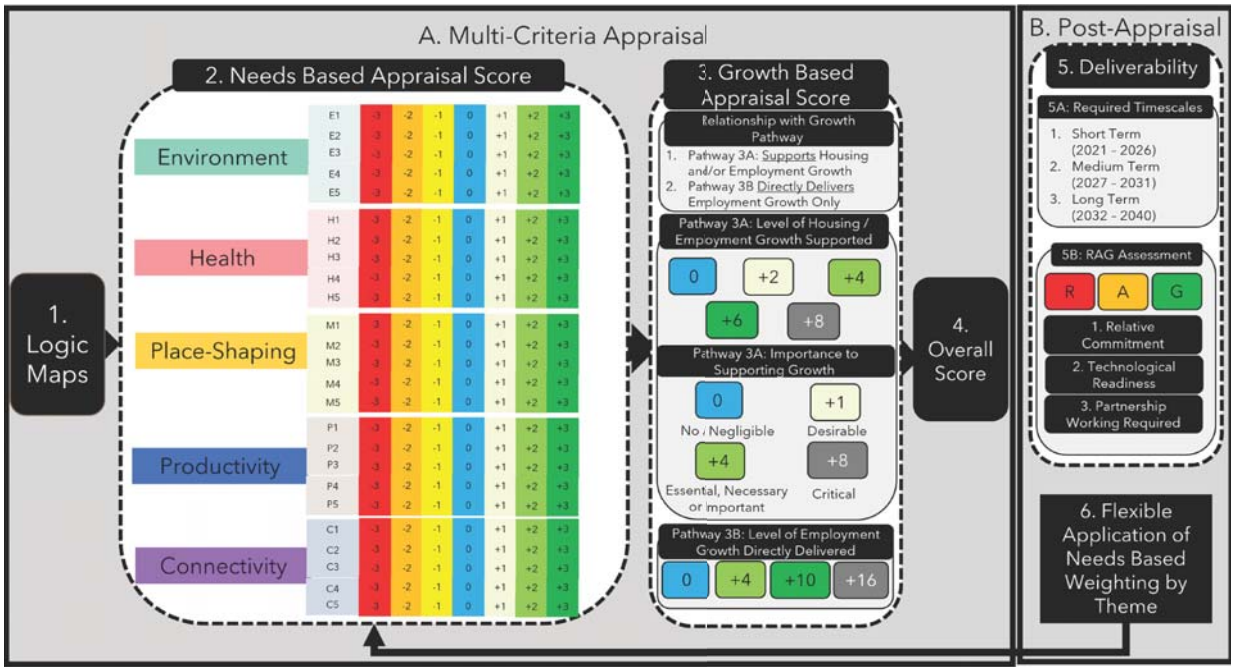
# 6. Outcome of OxIS Stage 1: Multi-Criteria Scheme Appraisal

This OxIS Stage 1 includes an objective and logical needs- and growth-based multi-criteria appraisal underpinned by the Oxfordshire Growth Board's growth priorities.

A growth appraisal was added to recognise the importance of schemes (e.g. utilities infrastructure) which may not explicitly score well within the needs-based appraisal, yet remain critical to enabling, unlocking and unblocking delivery of development sites. It is therefore intended to complement the needs based appraisal score.




Factors impacting the scheme's relative deliverability, incorporating a consideration of the delivery timescales, technical complexity and level of required partnership working, has been considered post-appraisal as part of a Red Amber Green (RAG) assessment. This is intended to provide context only to the scheme's future prioritisation rather than form an intrinsic part of the overall score assigned.

This is for the following reasons:

- **Delivery & Funding Channel Uncertainty:** It is likely that there will be significant future changes in national policy (e.g. Planning White Paper), delivery mechanisms (e.g. Spatial Framework for the Oxford-Cambridge Arc) and funding opportunities which is likely to materially change the relative deliverability of schemes in the short term
- **Fluidity of Technology:** There may be schemes which are critical to fulfilling Oxfordshire's future needs yet may be technically challenging to deliver at the present time (e.g. hydrogen). These barriers are likely to erode over time to 2040, as new technology is developed
- **Established Partnerships:** The strong partnership working established through the Oxfordshire Growth Board means that collaborative working with key stakeholders is not necessarily a barrier to delivery of a scheme

A consideration of scheme deliverability post appraisal also considers the required timescales for scheme delivery based upon the information established in the original source documents and verified in discussions with Oxfordshire's District Councils and key strategic infrastructure providers.

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## 6.1 SCHEME APPRAISAL: REGIONAL SCHEMES

The following sections incorporate the outcomes of the multi-criteria and deliverability appraisal for regional scale schemes. The detailed components of the scoring assigned across each of the 25 needs is available in Appendix B.

### 6.1.1 Sub-National Schemes

| Type | OxIS Sub-National Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|
| | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| IF2 | ORC6: Grade Separation of Didcot East Rail Junction | 4 | 4 | 3 | 8 | 6 | 12 | 37 |

### 6.1.2 Cross-County Schemes

| Type | OxIS Cross-Country Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|
| | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| IF2 | SO30: Thame to Haddenham cycle route | 4 | 7 | 7 | 5 | 2 | 12 | 34 |

### 6.1.3 Oxfordshire County-Wide Schemes

| Type | OxIS County -Wide Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|
| | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| IF2 | ORC1: Oxford Railway Station – additional through platform (conversion of bay platform 1 or 2) | 3 | 3 | 2 | 6 | 4 | 12 | 30 |
| IF2 | ORC2: Cowley Branch Line Improvements including two new stations at Oxford Science Park & Oxford Business Park | 4 | 5 | 4 | 9 | 5 | 12 | 39 |
| IF2 | ORC7:Didcot Parkway station – additional platform | 3 | 4 | 2 | 5 | 3 | 12 | 29 |
| IF2 | ORC8: Didcot Goods Line – upgrade to passenger standard | 3 | 4 | 2 | 6 | 3 | 12 | 30 |
| IF2 | ORC9: Wolvercote Rail Junction – Capacity Upgrades | 2 | 3 | 2 | 5 | 4 | 12 | 28 |
| IF2 | ORC11: Hanborough Station additional platform and crossovers | 2 | 3 | 2 | 4 | 4 | 12 | 27 |
| IF2 | ORC13: New Rail station at Grove | 2 | 3 | 4 | 5 | 5 | 12 | 31 |
| IF2 | ORC14: Grove – rail line loop extension and additional crossovers | 2 | 3 | 4 | 5 | 5 | 12 | 31 |
| IF2 | ORC15: Oxford North Rail Junction – additional line bypassing junction on Up side | 3 | 4 | 3 | 4 | 4 | 12 | 30 |
| IF2 | ORC16: Oxford Canal Rail Junction – crossover between Up and Down Bletchley Lines | 2 | 2 | 3 | 4 | 4 | 12 | 27 |
| IF2 | ORC17: New rail station at Begbroke | 4 | 4 | 4 | 5 | 5 | 9 | 31 |
| IF2 | ORC18: Didcot North Junction – third rail line north of junction | 2 | 2 | 3 | 4 | 4 | 9 | 24 |
| IF2 | IHUB9: MaaSCAV: Smart Traffic lights | 0 | 3 | 1 | 1 | 4 | 0 | 9 |
| IF2 | IHUB10: DRIVEN Project: Updating of ATC to live blackcats. | 0 | 1 | 1 | 1 | 2 | 0 | 5 |
| IF2 | IHUB12: Endeavour Project: Parking bay sensors | 0 | 1 | 0 | 2 | 2 | 0 | 5 |
| IF2 | IHUB13: 5G Heart project: Fibre connectivity to roadside assets | 2 | 2 | 3 | 4 | 3 | 0 | 14 |
| IF6 | OIP6: Space AI and Autonomy Lab, Harwell | 0 | 3 | 2 | 9 | 0 | 4 | 18 |
| IF6 | OIP8: Locate Oxford Global Innovation Campus | -2 | 2 | 3 | 12 | 0 | 16 | 31 |
| IF6 | OIP20: West's End Global Innovation District | -2 | 2 | 4 | 11 | 0 | 16 | 31 |

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### 6.1.4 Cross-District Schemes

| Type | OxIS Cross-District Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|
| | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| IF1 | OC2: Yarnton Bulk Supply Point Reinforcement | 2 | 2 | 2 | 8 | 5 | 16 | 35 |
| IF2 | OCLCWIP1: Canal Path Walking and Cycling Improvements | 3 | 6 | 3 | 3 | 1 | 9 | 25 |
| IF2 | OCLCWIP13: Barracks Lane and Horspath Active Travel Improvement | 2 | 4 | 4 | 5 | 1 | 9 | 25 |
| IF2 | OCLCWIP21: South Oxford Path Walking and Cycling Improvements | 3 | 6 | 2 | 4 | 1 | 9 | 25 |
| IF2 | OCLCWIP25: Botley Road Walking and Cycling Improvements | 3 | 6 | 4 | 4 | 2 | 9 | 28 |
| IF2 | VoWH22: A34 bus lane northbound between Lodge Hill and Hinksey Hill & Lodge Hill Park and Ride | 5 | 7 | 4 | 6 | 6 | 12 | 40 |
| IF2 | SO21: Science Vale Active Travel Network | 5 | 10 | 8 | 7 | 2 | 12 | 44 |
| IF2 | SO23: Cycle Connection between Berinsfield/Culham to Oxford via the Roman Road bridleway | 4 | 8 | 8 | 7 | 2 | 12 | 41 |
| IF2 | SO40: Strategic Rapid Transit Park and Ride & Bus Priority Improvements on A4074 corridor | 5 | 7 | 4 | 10 | 5 | 12 | 43 |
| IF2 | SO53: A40 Link Road through Bayswater Brook from the A40 at Marsh Lane interchange to east of Sandhills | -3 | 1 | 3 | 5 | 2 | 12 | 20 |
| IF2 | SO69: New and upgraded cycling connections to Oxford, Berinsfield & Watlington via B480 and Burcot Lane / Dorchester Road / Stadhampton Road | 4 | 8 | 8 | 6 | 2 | 12 | 40 |
| IF2 | SO74: B480 Gateway Scheme including cycle lane improvements and bus priority measures | 3 | 7 | 5 | 10 | 3 | 16 | 44 |
| IF2 | SO75: Pedestrian and Cycle Bridge over A40 Northern Bypass | 1 | 6 | 5 | 4 | 1 | 12 | 29 |
| IF2 | WO55: Cycle Route from Eynsham to Oxford on B4044 | 4 | 8 | 9 | 6 | 2 | 9 | 38 |
| IF2 | C83: Pand & Ride at London Oxford Airport (approx 1,100 Spaces) | 4 | 5 | 3 | 4 | 2 | 12 | 30 |
| IF2 | C86: Junction improvements facilitating cross-corridor bus movements A44 to / from A4260 | 5 | 5 | 5 | 7 | 3 | 16 | 41 |
| IF2 | C87: Bus priority improvements on the A44 between Langford Lane and Bladon Roundabout | 5 | 5 | 5 | 8 | 3 | 16 | 42 |
| IF2 | OC23: Abingdon Road Corridor Improvements | 4 | 7 | 5 | 5 | 2 | 9 | 32 |
| IF2 | OC25: Banbury Road & Oxford Road Corridor Improvements | 4 | 8 | 7 | 5 | 2 | 9 | 35 |
| IF2 | OCCP&R1: Park & Ride at Cumnor (1,200 Spaces) | 4 | 5 | 3 | 4 | 2 | 9 | 27 |
| IF4 | OCCE1: New SEN School serving southern Oxfordshire | 0 | 7 | 4 | 9 | 0 | 16 | 36 |

### 6.1.5 District-Wide Schemes

| District | Type | OxIS District-Wide Regional Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| Cherwell | IF2 | C69: Improvements to A41 gateway corridor to Bicester including bus priority measures | 3 | 7 | 4 | 6 | 5 | 12 | 37 |
| | IF2 | C125: M40 Junction 10 capacity improvements | -3 | -3 | 2 | 7 | 5 | 16 | 24 |
| | IF2 | C131: New M40 junction at Southam Road in Banbury | -4 | -2 | 1 | 4 | 5 | 9 | 13 |

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| District | Type | OxIS District-Wide Regional Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| Oxford City-Wide | IF1 | OC1: Uprating of a section of the 132kV cable at Osney Lane Bulk Supply Point | 2 | 2 | 2 | 8 | 5 | 16 | 35 |
| | IF2 | OC3: Cycle Hire Stations | 1 | 8 | 7 | 6 | 3 | 12 | 37 |
| | IF2 | OC5: Emergency Active Travel Schemes | 2 | 8 | 7 | 6 | 2 | 12 | 37 |
| | IF2 | OC38: Zero Emission Zone (Phase II) | 6 | 9 | 7 | 6 | 4 | 12 | 44 |
| | IF2 | OC39: Controlled Parking Zones (city-wide) | 3 | 5 | 4 | 4 | 3 | 12 | 30 |
| | IF2 | OLCWIP28: Oxford Ring Road Active Travel Improvements | 2 | 5 | 2 | 5 | 1 | 9 | 24 |
| | IF2 | OLCWIP31: Low Traffic Neighbourhoods | 3 | 6 | 4 | 2 | 1 | 12 | 28 |
| | IF2 | OLCWIP32: Signing and parking Active Travel Improvements | 1 | 3 | 1 | 0 | 1 | 9 | 15 |
| | IF2 | OCCP&R2: Park & Ride Extension at Thornhill (465 Spaces) | 2 | 4 | 2 | 5 | 1 | 9 | 23 |
| South Oxfordshire | IF2 | SO20: Retrofitting to install Air Source Heat Pumps and Solar PV cells at South Oxfordshire Council leisure centres | 2 | 5 | 1 | 1 | 3 | 9 | 21 |
| | IF2 | SO24: Improvements to cycle routes to rail stations | 2 | 4 | 2 | 3 | 1 | 9 | 21 |
| | IF2 | SO26: Benson to Wallingford cycle route minor improvements | 2 | 5 | 5 | 3 | 1 | 9 | 25 |
| | IF2 | SO45: Culham Railway Station Enhancements | 1 | 2 | 2 | 7 | 2 | 12 | 26 |
| | IF2 | SO48: A4074 Golden Balls Roundabout Improvement and B4015 Widening | -2 | -1 | 1 | 6 | 3 | 16 | 23 |
| | IF4 | SO119: Expansion of secondary school capacity by 2fe, potentially at Icknield Community College | 0 | 1 | 4 | 7 | 1 | 16 | 29 |
| Vale of White Horse | IF1 | VoWH19: Retrofitting to install Air Source Heat Pumps and Solar PV cells at Vale of White Horse Council leisure centres | 2 | 5 | 1 | 1 | 3 | 9 | 21 |
| | IF2 | VoWH59: A34 Lodge Hill Interchange Upgrade including South Facing Slips | -2 | 2 | 2 | 5 | 4 | 16 | 27 |
| | IF7 | VoWH106: Restoration of the Wilts and Berks Canal from Melksham to Swindon, Wantage/Grove and Abingdon | 8 | 6 | 4 | 3 | 1 | 9 | 31 |
| | IF2 | WO37: Bablock Hythe crossing of River Thames | 1 | 5 | 6 | 2 | 1 | 9 | 24 |
| | IF2 | WO52: Witney to Carterton cycleway | 3 | 7 | 7 | 5 | 1 | 12 | 35 |
| | IF2 | WO57: Footpath / cycleway connecting Hanborough through Bladon to Woodstock | 3 | 5 | 5 | 3 | 1 | 9 | 26 |
| West Oxfordshire | IF2 | WO84: Improve access by road to Carterton including upgrade of B4477 and West facing slips at A40/B4477 | -2 | -1 | 3 | 4 | 4 | 12 | 20 |
| | IF7 | WO144: Evenlode Green Ribbon & Catchment Schemes including habitat restoration | 7 | 6 | 3 | 3 | 0 | 9 | 28 |
| | IF8 | WO161: Enhanced Library Provision at Witney, Carterton, Chipping Norton, Eynsham and Woodstock. | 0 | 2 | 5 | 3 | 0 | 9 | 19 |
| | IF11 | WO180: New waste transfer station | 4 | 1 | 0 | 6 | 0 | 16 | 27 |
| | IF13 | WO187: New one pump 2 bay fire station in Carterton | 5 | 1 | 4 | 6 | 0 | 12 | 28 |
| | IF13 | WO188: Various Thames Valley Police schemes including adaptation of Witney, Carterton, and Woodstock Police Stations. | 0 | 0 | 2 | 2 | 0 | 9 | 13 |
| | IF13 | WO189: 2-3 ambulance standby points in the District including ambulances | 0 | 1 | 2 | 3 | 0 | 12 | 18 |

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## 6.2 SCHEME APPRAISAL: LOCAL SCHEMES - OxIS TOWNS & SURROUNDS

| OxIS Towns & Surround | Type | OxIS Towns & Surrounds Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| 1. Oxford City | IF2 | OLCWIP2: Walton Street Active Travel Improvements | 2 | 5 | 3 | 3 | 1 | 9 | 23 |
| | IF2 | OLCWIP5: North Oxford Path | 2 | 4 | 2 | 2 | 1 | 9 | 20 |
| | IF2 | OLCWIP6: Marston Active Travel Improvements | 2 | 4 | 3 | 3 | 2 | 9 | 23 |
| | IF2 | OLCWIP8: Northway & Barton Active Travel Improvements | 2 | 6 | 2 | 4 | 1 | 9 | 24 |
| | IF2 | OLCWIP9: Headington Path | 2 | 5 | 2 | 4 | 0 | 9 | 22 |
| | IF2 | OLCWIP10: Headington Active Travel Improvements | 3 | 7 | 6 | 4 | 2 | 9 | 31 |
| | IF2 | OLCWIP12 Old Road Active Travel Improvements | 3 | 7 | 6 | 4 | 2 | 9 | 31 |
| | IF2 | OLCWIP15 Blackbird Leys Active Travel Improvements | 3 | 10 | 4 | 7 | 2 | 9 | 35 |
| | IF2 | OLCWIP16 Littlemore Active Travel Improvements | 2 | 6 | 3 | 6 | 1 | 9 | 27 |
| | IF2 | OLCWIP18 Rose Hill Active Travel Improvements | 2 | 5 | 2 | 6 | 1 | 9 | 25 |
| | IF2 | OLCWIP29: City Centre Active Travel Improvements | 2 | 7 | 5 | 7 | 1 | 12 | 34 |
| | IF2 | OLCWIP30: Jackdaw River Bridge | 2 | 4 | 2 | 4 | 1 | 9 | 22 |
| | IF1 | OC3: New substation required to support the Diamond Place regeneration | 2 | 2 | 2 | 8 | 5 | 16 | 35 |
| | IF2 | OC7: Broad Street Improvements | 2 | 6 | 6 | 6 | 2 | 12 | 34 |
| | IF2 | OC15: John Radcliffe Hospital on-site bus interchange & priority measures | 2 | 5 | 5 | 6 | 2 | 12 | 32 |
| | IF2 | OC16: Churchill Hospital additional bus & cycle access | 2 | 5 | 5 | 6 | 2 | 12 | 32 |
| | IF2 | OC24: B4495 Corridor Improvements (Hollow Way/ Between Towns Road/ Donnington Bridge) | 2 | 5 | 3 | 3 | 1 | 12 | 26 |
| | IF2 | OC27: Iffley Road Corridor Improvements | 4 | 7 | 6 | 6 | 2 | 12 | 37 |
| | IF2 | OC28: Cowley Road/ Garsington Road/ Watlington Road Corridor Improvements | 3 | 10 | 6 | 7 | 2 | 12 | 40 |
| | IF2 | OC30: Eastern Bypass corridor improvements / A3133 Kennington to Cowley Bus Priority Improvement Scheme | 3 | 6 | 5 | 7 | 5 | 12 | 38 |
| | IF2 | OC31: Northern Bypass corridor improvements between Cutteslowe Roundabout to Mash Lane including bus lanes | 3 | 5 | 5 | 5 | 5 | 12 | 35 |
| | IF2 | OC35: Traffic Filters and Supporting Measures | 3 | 6 | 4 | 2 | 1 | 12 | 28 |
| | IF2 | OCCTA1: A40 Crossing at Collinwood Road | 1 | 4 | 5 | 4 | 1 | 0 | 15 |
| | IF2 | OXG1: Oxford Smaller Scale Active Travel Schemes | 2 | 8 | 4 | 4 | 2 | 9 | 29 |
| | IF4 | OC42: Extensions to primary schools equivalent to 0.5FE, to cater for Oxford North and cumulative sites | 0 | 3 | 3 | 6 | 1 | 12 | 25 |
| | IF6 | OIP1: The Energy Systems Accelerator | 2 | 2 | 2 | 9 | 1 | 16 | 32 |
| | IF6 | OIP2: Clinical Biomanufacturing Facility | 0 | 3 | 2 | 6 | 0 | 4 | 15 |
| | IF6 | OIP3: BioEscalator 2 (Global Health & Life Sciences Cluster) | 0 | 2 | 2 | 8 | 0 | 4 | 16 |
| | IF6 | OIP7: Oxford – Singapore AI and Human-Machine Collaboration Institute | 0 | 2 | 2 | 7 | 0 | 4 | 15 |
| | IF6 | OIP21: Creative and Cultural Industries Hub | 0 | 2 | 4 | 7 | 0 | 4 | 17 |
| | IF8 | OC48: Blackbird Leys Regeneration New Community Hub | 0 | 6 | 6 | 6 | 0 | 9 | 27 |
| | IF10 | OC50: New City Centre GP provision to replace/ enhance Beaumont Street | 0 | 6 | 2 | 5 | 0 | 12 | 25 |
| | IF10 | OC51: New Health Centre in Summertown | 0 | 6 | 3 | 4 | 0 | 12 | 25 |

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| OxIS Towns & Surround | Type | OxIS Towns & Surrounds Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| 2. Abingdon & Surrounds | IF2 | VoWH50: Marcham Bypass and Frilford Junction | -3 | 3 | 4 | 3 | 3 | 16 | 26 |
| | IF2 | VOWH52: Shippon & Abingdon Pedestrian and Cycle Bridge | 1 | 5 | 3 | 4 | 1 | 12 | 26 |
| | IF2 | VOWH53: Barrow Road / unamed road (to Gozzards Ford) junction upgrade | 0 | 1 | 1 | 4 | 1 | 16 | 23 |
| | IF2 | VOWH54: Unnamed road (to Gozzards Ford)/A415 junction upgrade | 0 | 1 | 1 | 4 | 1 | 16 | 23 |
| | IF2 | VOWH55: Long Tow/Wootton Road junction upgrade | 0 | 1 | 1 | 4 | 1 | 16 | 23 |
| | IF2 | VOWH56: A415/A420 link road | -1 | 2 | 2 | 4 | 2 | 16 | 25 |
| | IF4 | VoWH70: Two form-entry primary school at Dalton Barracks | 0 | 4 | 6 | 7 | 1 | 12 | 30 |
| | IF4 | VoWH71: One form entry primary school, East of Kingston Bagpuize | 0 | 4 | 6 | 6 | 1 | 12 | 29 |
| | IF4 | VoWH72: New Primary School serving NW Grove Development | 0 | 3 | 5 | 7 | 1 | 12 | 28 |
| | IF4 | SO107: Two Two Form Entry primary schools at Culham (including early years) | 0 | 4 | 6 | 8 | 1 | 16 | 35 |
| | IF4 | SO108: 900 place secondary school at Culham | 0 | 5 | 6 | 8 | 1 | 16 | 36 |
| | IF7 | VoWH83: Dalton Barracks Parkland | 5 | 7 | 5 | 5 | 0 | 12 | 34 |
| | IF10 | VoWH186: New GP Surgery to Serve Dalton Barracks | 0 | 5 | 4 | 5 | 0 | 12 | 26 |
| | IF10 | SO210: New GP surgery provision at Culham | 0 | 5 | 3 | 5 | 0 | 16 | 29 |
| 3. Banbury | IF1 | C9: 300m of expansion and realignment in the gas infrastructure around Banbury | -1 | -1 | 2 | 4 | -1 | 16 | 19 |
| | IF2 | C72: Rejuvenating or Reloating Banbury Bus Station to provide enhanced capacity | 2 | 6 | 4 | 5 | 2 | 12 | 31 |
| | IF2 | C96: Re-designing Banbury Station forecourt to improve multi-modal interchange | 4 | 6 | 5 | 5 | 3 | 9 | 32 |
| | IF2 | C114: Improving capacity of north south routes: Cherwell Street/ A4620 Windsor Street corridor | -2 | -1 | 3 | 5 | 4 | 16 | 25 |
| | IF2 | C117: East-west strategic movements: Hennef Way corridor A422 Improvements | -2 | -1 | 3 | 5 | 4 | 16 | 25 |
| | IF2 | C118: East-west strategic movements: Warwick Road Corridor Improvements | -2 | -3 | 1 | 4 | 3 | 12 | 15 |
| | IF2 | C120: Review of Banbury Town Centre traffic circulation | -2 | -3 | 2 | 3 | 1 | 12 | 13 |
| | IF2 | C132: Banbury South East Link Road east of M40 J11 | -2 | -2 | 1 | 4 | 3 | 12 | 16 |
| | IF2 | C112: Car parking routeing and guidance system | 2 | 3 | 2 | 2 | 1 | 12 | 22 |
| | IF4 | C151: 2FE primary school - South of Salt Way | 0 | 4 | 4 | 8 | 1 | 16 | 33 |
| | IF4 | C152: Expansion of Longford Park Primary School from 1.5FE to 2FE | 0 | 3 | 4 | 7 | 1 | 16 | 31 |
| | IF4 | C168: New secondary school provision in Banbury | 0 | 5 | 4 | 7 | 1 | 16 | 33 |
| | IF7 | C182: Banbury Country Park Improvements | 7 | 7 | 2 | 4 | 0 | 9 | 29 |
| | IF9 | C282: Relocation of Banbury United Football Club | 1 | 2 | 3 | 7 | 1 | 16 | 30 |
| | IF10 | C305: Reconfiguration of primary care services in Bretch Hill / Ruscote area | 0 | 6 | 2 | 5 | 0 | 12 | 25 |
| | IF10 | C307: Reconfiguration of primary care services around the Horton Hospital | 0 | 6 | 2 | 6 | 0 | 16 | 30 |
| | IF13 | C339: Relocation of Banbury Fire Station | 0 | 1 | 3 | 4 | 0 | 12 | 20 |

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| OxIS Towns & Surround | Type | OxIS Towns & Surrounds Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| 4. Bicester | IF1 | C1: CHP and use of heat from Ardley Energy Recovery Facility | 2 | 2 | 2 | 7 | 3 | 9 | 25 |
| | IF2 | C16: Market Square Walking and Cycling Improvements | 2 | 6 | 5 | 4 | 0 | 12 | 29 |
| | IF2 | C17: Banbury Road walking and cycling improvements | 2 | 6 | 6 | 5 | 1 | 12 | 32 |
| | IF2 | C18: Buckingham Road walking and cycling improvements | 2 | 6 | 6 | 5 | 1 | 12 | 32 |
| | IF2 | C100: London Road level crossing - solution for closure | 0 | 2 | 5 | 5 | 2 | 12 | 26 |
| | IF2 | C102: Bicester Eastern Corridor highway capacity improvements | -3 | -3 | 0 | 6 | 3 | 16 | 19 |
| | IF2 | C103: Charbridge Lane Additional Capacity of new bridge to Gavray Drive | -4 | -3 | 0 | 6 | 3 | 16 | 18 |
| | IF2 | C104: Bicester south east perimeter road | -4 | -2 | 2 | 6 | 4 | 16 | 22 |
| | IF2 | C109: Bicester Western corridor improvements including Howes Lane/Bucknell Road Junction and A4095 realignment | -2 | -3 | 0 | 5 | 3 | 16 | 19 |
| | IF2 | C126: Central corridor: Kings End and Queens Avenue through to Field Street | 2 | 5 | 5 | 5 | 1 | 12 | 30 |
| | IF2 | CG1: Bicester Active Travel Package | 2 | 5 | 5 | 5 | 1 | 12 | 30 |
| | IF4 | C144: Primary School 2 FE (NW Eco Town) | 1 | 3 | 5 | 8 | 1 | 16 | 34 |
| | IF4 | C145: Primary School 2 FE (NW Eco Town) | 1 | 3 | 5 | 8 | 1 | 16 | 34 |
| | IF4 | C146: Primary School 2 FE (NW Eco Town) | 1 | 3 | 5 | 8 | 1 | 16 | 34 |
| | IF4 | C147: Gagle Brook Primary School Phase 2 (1 FE) | 0 | 3 | 5 | 8 | 1 | 16 | 33 |
| | IF4 | C166: New secondary school provision in North West Bicester including shared use cultural facilities. | 1 | 5 | 6 | 8 | 1 | 16 | 37 |
| | IF7 | C178: Community Woodland (43ha) – Chesterton (Burnehyll Community Woodland) | 5 | 7 | 4 | 4 | 0 | 9 | 29 |
| | IF7 | C218: Improving blue and green infrastructure in multiple green spaces in Bicester including Bure Park & Langford Brook Park. | 6 | 7 | 2 | 3 | 0 | 9 | 27 |
| | IF10 | C304: Reconfiguration of primary care services around the Bicester Community Hospital | 0 | 7 | 4 | 5 | 0 | 16 | 32 |
| | IF13 | C338: Relocation of Bicester Fire Station | 0 | 1 | 3 | 4 | 0 | 12 | 20 |
| 5. Carterton | IF2 | WOG2: Carterton Active Travel Improvement Scheme Package | 2 | 4 | 3 | 3 | 1 | 8 | 21 |
| | IF4 | WO118: Expansion of Carterton Community College | 0 | 3 | 4 | 6 | 1 | 8 | 22 |
| | IF9 | WO169: Provision of ATP plus potential additional changing facilities, Burford | 0 | 5 | 4 | 3 | 0 | 5 | 17 |
| | IF9 | WO172: Additional outdoor playing pitch provision and changing facilities, Carterton | 0 | 5 | 5 | 4 | 0 | 8 | 22 |
| | IF9 | WO175: Enhanced community use, changing and reception areas at Carterton Community College Sports Hall and ATP | 0 | 5 | 4 | 3 | 0 | 8 | 20 |
| 6. Chipping Norton | IF2 | WO85: Remove Primary Route Status from A44 and implement weight restrictions in town centre | 1 | 3 | 2 | 2 | 0 | 3 | 11 |
| | IF4 | WO108: 2FE Primary school (including nursery), East of Chipping Norton | 0 | 4 | 6 | 7 | 1 | 10 | 28 |

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| OxIS Towns & Surround | Type | OxIS Towns & Surrounds Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| 7. Didcot & Wallingford | IF2 | VoWH26: Access improvements to the A4185 at Harwell Campus | -1 | -1 | 1 | 5 | 2 | 12 | 18 |
| | IF2 | VoWH51: Milton Heights Pedestrian and Cycle Bridge | 1 | 4 | 3 | 5 | 1 | 12 | 26 |
| | IF2 | VoWH57: Steventon Signalised Junction and A4130 Widening (West of Milton Interchange) | 0 | 2 | 2 | 3 | 3 | 12 | 22 |
| | IF2 | VoWH58: Rowstock Roundabout Improvement | 0 | 3 | 4 | 6 | 3 | 16 | 32 |
| | IF2 | SO27: Didcot Town Cycle Improvements | 2 | 6 | 5 | 6 | 1 | 9 | 29 |
| | IF2 | SO28: Garden Line Cycle Improvements | 3 | 6 | 2 | 5 | 1 | 9 | 26 |
| | IF2 | SO29: Premium cycle route between Didcot, Crowmarsh Gifford and Wallingford | 4 | 9 | 6 | 7 | 2 | 9 | 37 |
| | IF2 | SO31: Didcot Parkway interchange cycling improvements | 1 | 4 | 1 | 3 | 1 | 9 | 19 |
| | IF2 | SO76: Central Didcot Corridor improvement Scheme | 3 | 7 | 8 | 7 | 2 | 12 | 39 |
| | IF2 | SO83: Didcot Northern Perimeter Road Phase 3 | -2 | 0 | 3 | 6 | 3 | 16 | 26 |
| | IF2 | SO88: Town-wide Controlled Parking Zone in Didcot | 3 | 4 | 3 | 3 | 1 | 9 | 23 |
| | IF4 | SO120: One new 8 Form Entry secondary school in Didcot North East | 0 | 5 | 5 | 8 | 1 | 16 | 35 |
| | IF6 | OIP4: Gateway to the UK Space Sector, Harwell | 0 | 3 | 2 | 9 | 0 | 10 | 24 |
| | IF6 | OIP5: Disruptive Innovation in Space Centre, Harwell | 0 | 3 | 2 | 8 | 0 | 4 | 17 |
| | IF6 | OIP22: Facility for Industrial Scale-Up Support, Harwell | 0 | 3 | 2 | 8 | 0 | 4 | 17 |
| | IF6 | OIP31: Howbery Park Centre of Excellence in Climate Change | 2 | 3 | 2 | 7 | 0 | 4 | 18 |
| | IF7 | SO140: Didcot North East Nature park and Green Infrastructure Corridor | 5 | 7 | 5 | 4 | 0 | 12 | 33 |
| | IF10 | VoWH192: New GP surgery at Great Western Park in Didcot | 0 | 7 | 4 | 5 | 0 | 16 | 32 |
| | IF10 | SO215: Expansion of primary care facilities to serve central / north Didcot | 0 | 6 | 2 | 4 | 0 | 16 | 28 |
| 8. Wantage & Grove | IF2 | VoWH41: Grove Northern Link Road Missing Link | -1 | 1 | 4 | 5 | 2 | 14 | 25 |
| | IF10 | VoWH190: New GP Surgery at Mably Way in Wantage | 0 | 6 | 4 | 5 | 0 | 10 | 25 |

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| OxIS Towns & Surround | Type | OxIS Towns & Surrounds Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| 9. Witney | IF1 | WO6: Gas network reinforcement equivalent to 450M x 250mm in Witney | -1 | -1 | 2 | 5 | -1 | 10 | 14 |
| | IF1 | WO5: 0.5km of improvements to the gas network around Witney | -1 | -1 | 2 | 4 | -1 | 10 | 13 |
| | IF2 | WO16: Pedestrian Cycle improvements from Curbridge Road along Thorney Leys to Station Lane employment | 2 | 4 | 2 | 3 | 0 | 10 | 21 |
| | IF2 | WO58: East Witney Active Travel Package | 1 | 4 | 3 | 3 | 0 | 10 | 21 |
| | IF2 | WO78: Shores Green Slip Roads on A40 | -1 | 2 | 2 | 5 | 4 | 14 | 26 |
| | IF2 | WO79: Improvements to Bridge Street & Staple Hall junctions including public realm and traffic management | 2 | 5 | 4 | 4 | 0 | 10 | 25 |
| | IF2 | WO80: Improvements to Oxford Hill/Cogges Hill Road/Jubilee Way junction | -1 | 0 | 1 | 4 | 1 | 14 | 19 |
| | IF2 | WO81: Re-designating the A4095 via Jubilee Way, Oxford Hill, A40 at Shores Green to Ducklington Lane and Thorney Leys. | 0 | 3 | 1 | 3 | 0 | 10 | 17 |
| | IF2 | WO86: Provision of additional off street public car parking spaces | -1 | -1 | 0 | 2 | 1 | 10 | 11 |
| | IF2 | WOG1: Witney Walking and Cycling Package of Improvements | 2 | 6 | 4 | 5 | 2 | 10 | 29 |
| | IF3 | WO98: West End Link Road flood storage area on the flood plain of the River Windrush | 5 | 2 | 1 | 6 | 2 | 7 | 23 |
| | IF3 | WO99: Flood storage upstream of Hailey Road in Witney | 5 | 2 | 1 | 4 | 2 | 10 | 24 |
| | IF3 | WO94: Flood storage upstream and downstream of Crawley | 4 | 2 | 1 | 4 | 2 | 10 | 23 |
| | IF4 | WO106: 2FE Primary school (including nursery), North Witney | 0 | 4 | 5 | 7 | 1 | 14 | 31 |
| | IF4 | WO110: Improvements and capacity increases to existing primary school provision by approximately 1 form entry in Witney and surrounding area. | 0 | 3 | 3 | 7 | 1 | 14 | 28 |
| | IF4 | WO114: Secondary school additional provision (Either Expansion of Woodgreen School and/or Henry Box School) | 0 | 5 | 5 | 7 | 1 | 14 | 32 |
| | IF4 | WO119: New adult learning centre | 0 | 1 | 4 | 9 | 0 | 10 | 24 |
| | IF8 | WO157: Witney Arts Centre | 0 | 2 | 7 | 5 | 0 | 7 | 21 |
| | IF9 | WO171: Additional outdoor playing pitch provision and changing facilities in Witney | 0 | 5 | 4 | 5 | 0 | 10 | 24 |
| | IF9 | WO173: Replacement of Windrush Leisure Centre | 0 | 7 | 5 | 4 | 0 | 7 | 23 |

## 6.3 SCHEME APPRAISAL: LOCAL SCHEMES - OxIS RURAL COMMUNITIES

| OxIS Rural Community | Type | OxIS Rural Community Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| 10. Berinsfield | IF2 | SO62: New access on to A4074 from Berinsfield allocation | -2 | 0 | 3 | 5 | 3 | 12 | 21 |
| | IF2 | SO64: Berinsfield Roundabout (A4074 / A415) Junction Upgrade | -1 | 1 | 2 | 4 | 3 | 12 | 21 |
| | IF4 | SO102: Primary School capacity increases including at least one new school site to serve Berinsfield | 0 | 3 | 4 | 8 | 1 | 12 | 28 |
| | IF8 | SO168: Upgrade of Abbey Sports Centre and Library to accommodate new community facilities in a 'community hub', potentially including a health centre | 0 | 7 | 7 | 6 | 0 | 12 | 32 |

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| OxIS Rural Community | Type | OxIS Rural Community Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| 11. Chalgrove | IF2 | SO65: Stadhampton & Chiselhampton Bypass: Associated with Chalgrove connecting with the B480 | -3 | 1 | 4 | 4 | 3 | 12 | 21 |
| | IF2 | SO66: Cuxham Bypass connecting with the B480 | -2 | 1 | 4 | 4 | 2 | 12 | 21 |
| | IF4 | SO106: Two x 2 Form Entry primary schools at Chalgrove (including early years) | 0 | 4 | 5 | 8 | 1 | 12 | 30 |
| | IF4 | SO116: One new consolidated 1,500 place secondary school | 0 | 3 | 5 | 8 | 1 | 12 | 29 |
| | IF10 | SO209: New GP surgery in the Chalgrove area | 1 | 6 | 5 | 5 | 1 | 12 | 30 |
| 12. Eynsham & Long Hanborough | IF2 | WO59: Cycle Route between Eynsham and Hanborough Station and other bridleway upgrades | 2 | 6 | 6 | 5 | 1 | 9 | 29 |
| | IF2 | WO60: Saltcross Garden Village crossings of A40 | 1 | 3 | 4 | 5 | 0 | 12 | 25 |
| | IF2 | WOG3: Eynsham Active Travel Improvement Package | 2 | 3 | 2 | 4 | 1 | 12 | 24 |
| | IF4 | WO105: New 1.5FE Primary School, West Eynsham (including nursery) | 0 | 4 | 6 | 7 | 1 | 16 | 34 |
| | IF4 | WO107: Up to 2 x 2FE Primary schools (including nursery), to serve Saltcross Garden Village | 0 | 4 | 6 | 8 | 1 | 16 | 35 |
| | IF4 | WO116: New secondary school or split-site expansion of Bartholomew School | 0 | 3 | 6 | 8 | 1 | 16 | 34 |
| 13. Grenoble Road and Northfield | IF4 | S109: One new 3-form-entry primary school at Grenoble Road. | 0 | 5 | 6 | 8 | 1 | 14 | 34 |
| | IF4 | SO112: Three Form Entry Primary School at Northfield (including early years) | 0 | 4 | 6 | 8 | 1 | 14 | 33 |
| | IF4 | SO117: A 1,500 place secondary school at Grenoble Road | 0 | 5 | 6 | 8 | 1 | 14 | 34 |

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| OxIS Rural Community | Type | OxIS Rural Community Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| 14. South Cherwell area & Woodstock | IF2 | C41: Pedestrianisation of part of Kidlington High Street | 2 | 5 | 5 | 5 | 0 | 12 | 29 |
| | IF2 | C47: Public realm improvements on the A4260 between Benmead Road & Yarnton Road | 2 | 4 | 4 | 4 | 1 | 12 | 27 |
| | IF2 | C50: Sandy Lane – pedestrian and cycle new link over railway | 1 | 4 | 5 | 5 | 0 | 16 | 31 |
| | IF2 | C58: Upgrade existing footbridge over the railway linking to Northern Gateway | 1 | 4 | 2 | 4 | 0 | 16 | 27 |
| | IF2 | C62: Cycle and pedestrian improvements along Langford Lane | 2 | 4 | 4 | 5 | 1 | 16 | 32 |
| | IF2 | C84: Bus priority and bus stop improvements along the A4260 / A4165 | 5 | 5 | 5 | 7 | 4 | 16 | 42 |
| | IF2 | C89: Expansion of Oxford Parkway P&R (approx. 1,000 spaces) | 3 | 5 | 3 | 5 | 2 | 12 | 30 |
| | IF4 | WO113: Capacity increases at existing primary schools in Woodstock, Eynsham, Enstone and Stanton Harcourt / Sutton | 0 | 3 | 3 | 7 | 1 | 16 | 30 |
| | IF4 | WO117: Extensions to Marlborough School, Woodstock | 0 | 3 | 5 | 6 | 1 | 12 | 27 |
| | IF4 | C160: Primary School 2FE at Land East of Oxford Road | 0 | 3 | 4 | 7 | 1 | 16 | 31 |
| | IF4 | C161: Additional permanent accommodation at Edward Field Primary School | 0 | 3 | 3 | 7 | 1 | 16 | 30 |
| | IF4 | C162: Primary School 3FE at Land East of the A44 | 0 | 3 | 4 | 7 | 1 | 16 | 31 |
| | IF4 | C163: Primary School 2FE at Land East of the A44 | 0 | 3 | 4 | 7 | 1 | 16 | 31 |
| | IF4 | C164: Enhancements to William Fletcher Primary School including additional playing field land and expansion by 0.5 FE | 0 | 5 | 3 | 7 | 1 | 16 | 32 |
| | IF4 | C165: Secondary school (1100- place) at Land East of the A44 | 0 | 5 | 5 | 8 | 1 | 16 | 35 |
| | IF7 | C231: Nature conservation area incorporating community orchard and with potential to link to and extend Stratfield Brake DWS | 6 | 6 | 4 | 3 | 0 | 9 | 28 |
| | IF7 | C234: Nature conservation area on land to the east of the railway line and north of Sandy Lane | 6 | 6 | 4 | 4 | 0 | 12 | 32 |
| | IF7 | C234: Nature conservation area on land to the east of the railway line and north of Sandy Lane | 5 | 6 | 4 | 4 | 0 | 12 | 31 |
| | IF7 | C250: Local Nature Reserve based on Rowel Brook at Land East of the A44 | 5 | 6 | 4 | 4 | 0 | 12 | 31 |
| | IF7 | C216: Measures for the protection and enhancement of the Oxford Canal corridor and towpath including habitat restoration | 4 | 5 | 3 | 4 | 1 | 12 | 29 |
| | IF7 | C235: Local Nature Reserve at Land West of Yarnton | 4 | 4 | 2 | 4 | 0 | 12 | 26 |
| | IF7 | C251: Local Nature Reserve on Frogwelldown Lane | 4 | 4 | 2 | 4 | 0 | 12 | 26 |
| | IF9 | WO167: Outdoor floodlit training area and/or ATP, Woodstock | 0 | 6 | 4 | 3 | 0 | 9 | 22 |
| | IF9 | C275: Development of Kidlington Leisure Centre, including focus on additional learner pool provision | 0 | 6 | 4 | 3 | 0 | 9 | 22 |
| | IF9 | C292: Formal sport pitches provision at Land South East of Kidlington | 0 | 5 | 4 | 4 | 0 | 12 | 25 |
| | IF9 | C293: Sports hall at new Secondary School for shared community use | 0 | 5 | 4 | 4 | 0 | 12 | 25 |
| | IF9 | C294: Additional swimming pool space by replacement pool of 25m x 6 lane pool plus teaching pool at Kidlington and Gosford Leisure Centre | 0 | 6 | 4 | 4 | 0 | 12 | 26 |
| | IF9 | C291: Converting existing Hockey AGP at Kidlington and Gosford Leisure Centre to 3G | 0 | 5 | 4 | 4 | 0 | 12 | 25 |
| | IF10 | WO176: Relocation of GP practices in Woodstock | 0 | 5 | 2 | 4 | 0 | 12 | 23 |
| | IF10 | C311: Provision of GP health facilities in Kidlington through development of Exeter Hall or New Local Centre | 0 | 7 | 3 | 5 | 0 | 16 | 31 |

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| OxIS Rural Community | Type | OxIS Rural Community Scheme | Needs Based Appraisal | | | | | Growth | Overall Score |
|---|---|---|---|---|---|---|---|---|---|
| | | | Environment | Health | Place Shaping | Productivity | Connectivity | | |
| 15. Upper Heyford | IF4 | C159: Expansion of Heyford Park School plus equivalent of a new 1 - 1.5 FE primary school | 0 | 3 | 5 | 7 | 1 | 12 | **28** |
| 16. Faringdon & Shrivenham | IF2 | VoWH25: Signalised Junction Improvements at the A420 / Coxwell Road Junction | 0 | 1 | 1 | 4 | 2 | 10 | **18** |
| | IF4 | VoWH74: New Primary School facilities on Land south of Park Road, Faringdon | 0 | 3 | 4 | 8 | 1 | 10 | **26** |
| | IF4 | VoWH75: 1FE primary school at North Shrivenham | 0 | 3 | 4 | 6 | 1 | 10 | **24** |
| 17. Bayswater Brook | IF4 | SO111: New 1.5 FE Primary School at Bayswater Brook site (including early years) | 0 | 4 | 6 | 8 | 1 | 10 | **29** |
| | IF10 | SO214: Expansion / reconfiguration of Morland House Surgery | 0 | 5 | 2 | 4 | 0 | 10 | **21** |

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# 7. OxIS Stage 1 Scheme Funding & Deliverability

Based on our collation of Strategic Infrastructure Schemes, to date, there is set to be a considerable funding gap, in OxIS Stage 1 to 2040. However, Identifying and prioritising strategic infrastructure requirements is just part of the challenge, with the securing of adequate funding often providing the greatest risk to its delivery.

This section will cover some of the traditional routes to funding, an update on the funding opportunities identified in OxIS-17 and highlight emerging and new funding opportunities available for OxIS Stage 1. COVID-19 has significantly restricted the revenue streams available within the public sector, and within this report alternative opportunities available to the public sector have been identified to generate revenues that could contribute to the capital funding requirement.

This section covers the current, known and emerging funding opportunities, however in the period to 2040 it must be acknowledged that both the resulting impact of COVID-19 and the increased political pressure to reach Net Zero by 2050 are known factors that will impact funding opportunities. Further to this, the requirement for resilience and diversity of funding opportunities continues to be of value to reduce risk.

## 7.1 THE FUNDING GAP

The total cost of the infrastructure schemes included within OxIS Stage 1 for appraisal to 2040 is £9.1 billion. Known funding for these projects currently stands at £76 million, with a further £2.9bn anticipated to be met by the private sector, resulting in a funding requirement of £6 billion.

It is recognised that the strategic infrastructure schemes included within OxIS are reflective of the infrastructure types that are the responsibility of the key stakeholders and providers for Oxfordshire, and as such the funding requirement does not reflect the significant private sector funding that will be made in some sectors such as for energy and digital infrastructure. Even within the sectors that the county will provide infrastructure, the source of funding for some of these infrastructure projects will come from the private sector where there is a commercial opportunity.

It should also be noted that the funding requirements and gaps identified in this report are reflective of the infrastructure schemes that have been available to be assessed for OxIS Stage 1, and that where further infrastructure schemes are developed to meet needs gaps, additional funding will be required.

Known funding figures have only been included in the summary where they are certain, and as such, there are potential, unallocated, funding pots that could also contribute to these infrastructure projects that have not been included due to their current uncertainty, such as Section 106 funds or competitive bidding funds. For example, of the schemes assessed in OxIS Stage 1 to 2040, 38% of the infrastructure schemes have noted an expectation to be funded, or part-funded through Section 106 or Community Infrastructure Levy funds.

Further to this, funding policy and opportunities have been constantly transforming over the last year as the country adapts to COVID-19 and reacting to the wider impact on society and business, looking to strengthen the economy through a focus on sustainable infrastructure that will increase resilience.

### 7.1.1 Since 2017

A key positive is that, since the publication of the previous OxIS-17, there has been the release of the UK Governments National Infrastructure Strategy (November 2020) which outlines an increase in the level of central Government funding with a particular focus on economic infrastructure, levelling up the UK and decarbonising the economy. It is hoped that this commitment will alleviate some previous funding gaps.

One of the key outcomes of OxIS-17 was the ability to secure significant funding for infrastructure, particularly for projects funded by the Growth Deal and the Housing Infrastructure Fund. A key learning from OxIS-17 was the ability for a well-defined Infrastructure strategy and needs identification to support closing the funding gap through a demonstratable growth and needs case for each infrastructure project as documented by the multi-criteria assessment. The OxIS Stage 1 report has aimed to address this.

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## 7.2 FUNDING RESPONSIBILITY & STREAMS BY INFRASTRUCTURE TYPE

The responsibility for constructing and maintaining Oxfordshire's infrastructure falls upon a diverse group of public and private bodies, supported by a diverse array of funding streams.

| Infrastructure Type | Sub-Category | Responsible for Building | Current Funding Streams |
|---|---|---|---|
| **IF1: Energy** | IF1A: District Heating Network | OCC, Councils, private energy/heat providers | Heat Network Delivery Unit, Private operator investment |
| | IF1B: Energy Transmission Network | National Grid, SSEN | Private energy provider investment |
| | IF1C: Gas Distribution Network | National Grid, SGN | Private energy provider investment |
| **IF2: Transport** | IF2A: Active Travel | OCC, Councils | Local authority, DfT, OxLEP |
| | IF2B: Bus, Coach & Rapid Transit | Bus companies | Customer fares |
| | IF2C: Rail | Network Rail | Allocated funding under Control P6 |
| | IF2D: Road | Highways England, OCC | Highways England, local authority, DfT |
| | IF2E: Traffic Management | OCC, Councils | Local authority |
| | IF2F: Electric or Hydrogen Vehicle Charging Infrastructure | OCC, Private Companies, Social Enterprises | Local authority, private investment |
| | IF2G: Aviation | Private companies | Private investment. |
| **IF3: Flood Alleviation** | IF3A: Flood Alleviation | OCC, Environment Agency | UK Government , Thames Water |
| | IF3B: Sustainable Drainage | OCC, Environment Agency, Thames Water | UK Government, Thames Water |
| **IF4: Education** | IF4A: Early Years Education Facilities | OCC, private providers | DfE/ESFA, private investment |
| | IF4B: Primary Schools | OCC, private schools | |
| | IF4C: Secondary Schools | OCC, private schools | |
| | IF4D: Higher Education Facilities | OCC, colleges, private schools | |
| | IF4E: Special Education Needs Schools | OCC, private schools | |
| **IF5: Digital Connectivity** | IF5A: Superfast Broadband Network | OCC, Councils, private operators | UK Government, private investment |
| | IF5B: Cellular Towers & Networks | Private operators | |
| **IF6: Innovation** | IF6A: Innovation Hubs / Labs | Private & social enterprises, universities | Local authority, private investment |
| **IF7: Green & Blue Infrastructure** | IF7A: Green Infrastructure | OCC, Councils, Environment Agency, Private Landowners, other LAs, Water Utilities, NGO's. | Local authority, Environment Agency, Water Utilities, Private Investment, Competitive/Grant Funding |
| | IF7B: Blue Infrastructure | | |
| **IF8: Community & Cultural** | IF8A: Museums, Tourist Attractions & Public Art | OCC, Councils, private companies | Local authority, private investment |
| | IF8B: Cemeteries & Crematoriums | OCC, Councils, Religious organisations | Local authority, religious organisations |
| | IF8C: Points of Interest | OCC, Councils, private companies | Local authority, private investment |
| | IF8D: Large Community Hubs | OCC, Councils | Local authority |
| **IF9: Sport & Leisure** | IF9A: Indoor Sport Facilities | OCC, Councils, private companies | Local authority, private investment |
| | IF9B: Outdoor Sport Facilities | | |
| **IF10: Primary Healthcare & Adult Social Care** | IF10A: Health Centres | OCCG, NHS Hospital Trusts, NHS England, NHS Property Services, Community Health Partnerships | NHS England, competitive funds |
| | IF10B: Community Hospitals | OCC, private providers | |
| **IF11: Waste & Recycling** | IF11A: Waste Processing Facilities | OCC, District Councils | Local authority, private investment |
| **IF12: Water Supply** | IF12A: Wastewater Treatment Plants | Thames Water | OFWAT (Customer charges) |
| | IF12B: Potable Water Supply | | |
| **IF13: Emergency Services** | IF13A: Fire Stations | Oxfordshire Fire & Rescue Services | Central Government, council tax allocation |
| | IF13B: Police Stations | Thames Valley Police | |
| | IF13C: Ambulance Depots | South Central Ambulance Service NHS Trust | NHS England |

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## 7.3 NEW & EMERGING FUNDING STREAMS

The below fifteen funding sources (see Section 8.4 of the OxIS Stage 1 Technical Report) provide a breadth (community, productivity, land, homes, environmental, transport & innovation) of additional opportunities to fund new infrastructure.

| | | | | |
|---|---|---|---|---|
| UK Infrastructure Bank | The Community Ownership Fund | Future High Streets Fund | Getting Building Fund | Green Recovery Challenge Fund |
| National Home Building Fund | The Levelling Up Fund | Brownfield Land Release Fund | National Home Building Fund | Zero Emission Bus Regional Areas Scheme |
| Bus Back Better | Other Innovation Funding | UK Shared Propensity Fund | Green Homes Grant | Home Upgrade Grant |

Borrowing opportunities are also outlined in the OxIS Stage 1 Technical Report including Bonds, Public Works Loan Board, tax increment financing and business rate retention schemes.

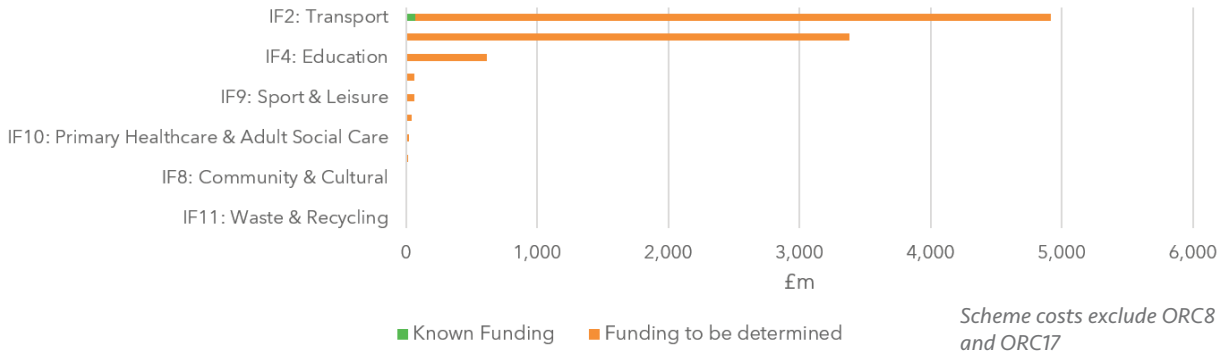
## 7.3 NEW & EMERGING FUNDING STREAMS

The funding gap has been broken down by infrastructure type outlining the significant funding gap in relation to Transport, Innovation & Enterprise and Education.

In some areas of infrastructure, such as Energy and Digital, the development of schemes is fully managed by the private sector. Where this is the case, it can obscure the visibility of both the funding need and the funding commitment. The result of this is that, in some cases funding for specific infrastructure will appear low if considered without the wider context. A good example of this is Digital – there is an expectation that full fibre in urban areas will be fully funded commercially by the private sector.

Innovation & Enterprise shows a public sector funding gap of just 14% (£475m), the remaining funding requirement has been designated as private sector funding. The security of the private sector contributions has not been assessed and it therefore not yet guaranteed. This level of private sector and commercial investment is not reflected in other infrastructure types due to commercial sensitivities.

Commercial sensitivities also limit the degree to which schemes have been listed. The below therefore shows no funding need for IF5 and no funding committed. This is clearly not the case.




*Scheme costs exclude ORC8 and ORC17*

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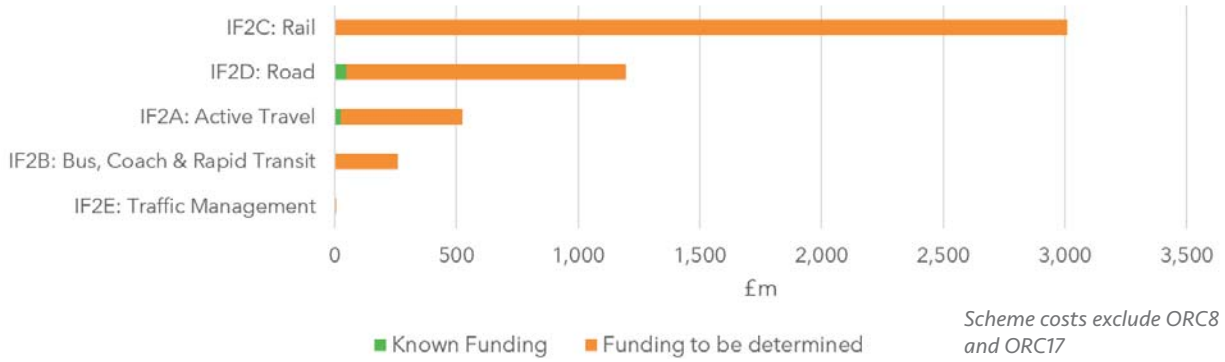
As shown below, rail represents the largest funding requirement for transport infrastructure schemes, hence rail representing half of the 10 largest schemes. Transport funding will primarily be sourced from Central Government and the DfT. DfT Capital expenditure for the South East (incorporating Oxfordshire) has averaged £2.1bn per annum over 2015-2019. In the year 2019/20 this expenditure increased by 31% to £3bn.




*Scheme costs exclude ORC8 and ORC17*

The 10 largest schemes appraised in OxIS make up 63% of the funding requirement. These schemes are Transport (mostly rail) and Innovation & Enterprise.

| Scheme | Infrastructure Type | Total Cost Estimate | Private Sector Estimate | Public Sector Estimate |
|---|---|---|---|---|
| OIP20: West's End Global Innovation District | IF6A: Innovation Hubs / Labs | £1.53bn | £1.48bn | £46m |
| ORC6: Grade Separation of Didcot East Rail Junction | IF2C: Rail | £1.3bn | | £1.6bn |
| OIP8: Locate Oxford Global Innovation Campus | IF6A: Innovation Hubs / Labs | £1.3bn | £1.2bn | £90m |
| ORC1: Oxford Station Additional Through Platform & Associated Line Capacity Upgrades | IF2C: Rail | £675m | | £675m |
| ORC14: Grove – rail line loop extension and additional crossovers | IF2C: Rail | £304m | | £304m |
| OIP1: The Energy Systems Accelerator | IF6A: Innovation Hubs / Labs | £172m | £76m | £96m |
| OC30: Eastern Bypass A423 / A3133 Kennington to Cowley Bus Priority Improvement Scheme | IF2D: Road | £158m | | £158m |
| ORC15: Oxford North Rail Junction – additional line bypassing junction on Up side | IF2C: Rail | £142m | | £142m |
| ORC13: New Rail Station at Grove | IF2C: Rail | £134m | | £134m |
| ORC11: Hanborough Station additional platform including Cotswolds line capacity upgrades | IF2C: Rail | £123m | | £123m |

Of the schemes assessed, 38% of the schemes expect to derive some, or all, of their funding from developer contributions (Either Section 106 or Community Infrastructure Levy, see Section 8.3 of the Technical Report). However, in real terms, this represents just 8% of the funding requirement with the total cost of these schemes totalling £1bn. As at 31/03/2020, Oxfordshire released a Section 106 Infrastructure Funding Statement identifying secured funding totalling £257m (OCC, 2020). Community Infrastructure Levy charges remain with the district councils, as at 31/03/2020 only three of the five district councils had formally adopted Community Infrastructure Levy policies, and the summary of their funds is provided in the OxIS Stage 1 Technical Report.

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## 7.3 FUNDING SUMMARY

Whilst this analysis highlights the funding gaps for known infrastructure schemes, the below looks to provide an indication of funding availability where there are scheme deficits across the core OxIS Infrastructure Types.

An example of this will be for Environmental Schemes, where there have been insufficient schemes proposed to meet the needs of Oxfordshire to 2040, but where specific funding is available to meet that criteria have been identified, for many infrastructure types. Using this knowledge, schemes can be built and proposed that can target the funding opportunity whilst addressing the needs of the county.

| | IF1: Energy | IF2: Transport | IF3: Flood Alleviation | IF4: Education | IF5: Digital | IF6: Innovation | IF7: Green & Blue | IF8: Cultural | IF9: Sport and Leisure | IF10: Healthcare | IF11: Waste & Recycling | IF12: Water & Wastewater | IF13: Emergency Services |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Basic Need Central Government Grant Scheme | | | | ✓ | | | | | | | | | |
| Priority School Building Programme | | | | ✓ | | | | | | | | | |
| Section 106 agreements | | ✓ | | ✓ | | | | ✓ | ✓ | ✓ | | | |
| Community Infrastructure Levy | | ✓ | | ✓ | | | | ✓ | ✓ | ✓ | | | |
| Health Infrastructure Plan 3 | | | | | | | | | | ✓ | | | |
| UK Infrastructure bank | ✓ | ✓ | | | | | ✓ | | | | | | |
| Innovation funding | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| The Community Ownership Fund | | | | | | ✓ | | ✓ | ✓ | | | | |
| Future High Streets Fund | | ✓ | | | | ✓ | | ✓ | | | | | |
| Getting Building Fund | ✓ | | | | ✓ | ✓ | | ✓ | | | | | |
| Green Recovery Challenge | | | | | | | ✓ | ✓ | | | | | |
| The Levelling Up Fund | | ✓ | | | ✓ | ✓ | | ✓ | | | | | |
| Brownfield Land Release Fund | | | | | | ✓ | | | | | | | |
| Home Building Fund | | | | | | ✓ | | | | | | | |
| UK Shared Prosperity Fund | | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | | | |
| Zero Emission Bus Regional Areas Scheme | | ✓ | | | | | | | | | | | |
| Bonds | ✓ | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | | ✓ |
| Public Works Loans Board | ✓ | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | | ✓ |
| Tax Increment Financing | ✓ | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | | ✓ |
| Business Rate Retention | ✓ | | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | | | ✓ |
| Propensity for Private Sector Funding | ✓ | | | | ✓ | ✓ | | ✓ | ✓ | | ✓ | ✓ | |

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# 8. Conclusions

As outlined throughout this OxIS Stage 1 Report, Oxfordshire has many needs to be addressed by strategic infrastructure, over the period to 2040. Although there are many schemes identified from a variety of sources (e.g. District IDPs & Funding Statements, District Local Plans, Oxfordshire Local Transport Plan 4 (Area & Corridor Strategies), Oxford Local Cycling & Walking Infrastructure Plan, Oxfordshire Rail Corridor Study, Thames Water Resource Management Plan, Oxfordshire Investment Plan, OCCG Primary Care Estates Strategy), there are many needs not addressed.

This is particularly relevant for the Environment Need, where many of the IDPs (for example) were developed prior to each Councils' declaration of a Climate Emergency.

Although similar to OxIS-17, there remains a funding gap, as outlined within Section 8 of the OxIS Stage 1 Technical Report, there are a number of avenues to address this, and the gap is not as stark as in 2017. Additionally, the OxIS Needs have been specifically aligned with central Government policy to ensure access to key funding opportunity. This is not withstanding of the private sectors role in supporting delivery of strategic infrastructure in some sectors (e.g. Energy and Digital).

## 8.1 NEXT STEPS ON OxIS STAGE 1 to 2040

The final version of the OxIS Stage 1 Summary Report and Technical Report will be finalised following the Regulation 18, part 2 of the Oxfordshire Plan 2050 consultation, in advance of OxIS Stage 2.

## 8.2 NEXT STEPS ON OxIS STAGE 2 to 2050

This Report will be followed by an **OxIS Stage 2 Report,** which will:

- Consider strategic infrastructure required to meet Oxfordshire's needs to 2050
- Form a core part of the evidence base underpinning the Oxfordshire Plan 2050
- Align with Regulation 19 of the Oxfordshire Plan 2050 consultation
- Apply a broadly similar appraisal approach adopted in the Stage 1 Report
- Identify and rank new strategic infrastructure requirements emerging from the Oxfordshire Plan 2050 growth options
- Reflect outcomes of the Oxfordshire Plan 2050 consultation process

OxIS Stage 2 will commence in 2022, following completion of the Regulation 18, part 2 of the Oxfordshire Plan 2050 consultation.

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**Appendix CL2.28**

**Oxfordshire Climate Action Framework (2020)**

# 2020 Climate Action Framework

Oxfordshire County Council
CLIMATE ACTION
Carbon neutral by 2030

OXFORDSHIRE COUNTY COUNCIL

This Climate Action Framework sets out our guiding principles and how we will mobilise to tackle this challenge through two connected roles:

- **Transforming our own organisation**
- **Enabling a zero-carbon Oxfordshire**

## WE ARE FOCUSING ON:

1 **Being a Climate Active Council**
page 4
2 **Operating at net-zero Carbon by 2030**
page 5, 6
3 **Supporting schools**
page 7
4 **Working with our suppliers**
page 7
5 **Enabling a net-zero Carbon Oxfordshire by 2050**
page 10-12

## THE PRINCIPLES GUIDING OUR WORK ON CLIMATE ACTION:

### Evidenced-based decisions

- We hold ourselves to account and take an open, smart approach to data gathering and sharing to accelerate our ability to re-prioritise investment
- We work with our world-class universities to develop the evidence to inform decisions

### Maximise Oxfordshire benefits

- You can count on our spending to support the growth of low-carbon jobs
- We support communities to own energy projects and retain the benefits locally

OUR NATURAL ENVIRONMENT

### Healthy Place Shaping

- We create sustainable, well-designed communities in which it is easy to eat well, be active and healthy

### Inclusive transition

- We support all our communities and businesses to participate
- We ensure costs and benefits are fairly shared
- We seek to design out energy inequality

### Continuous improvement and Living Laboratory

- Our estate is a **'Living Lab'** to trial new ideas and accelerate innovation
- We are actively seeking new business models to make investment for zero-carbon viable
- We share our learning

### Recognising a role for everyone

- We are asking everyone to participate: our staff, communities, suppliers, businesses, partners and national government
- We build partnerships to tackle systemic challenges

# A Climate Active Council

## Mobilising change

The Council's Climate Action Team is implementing a two-year climate action mobilisation phase that focuses on the priority teams, services and policies that are identified in this framework.

## A role for everyone

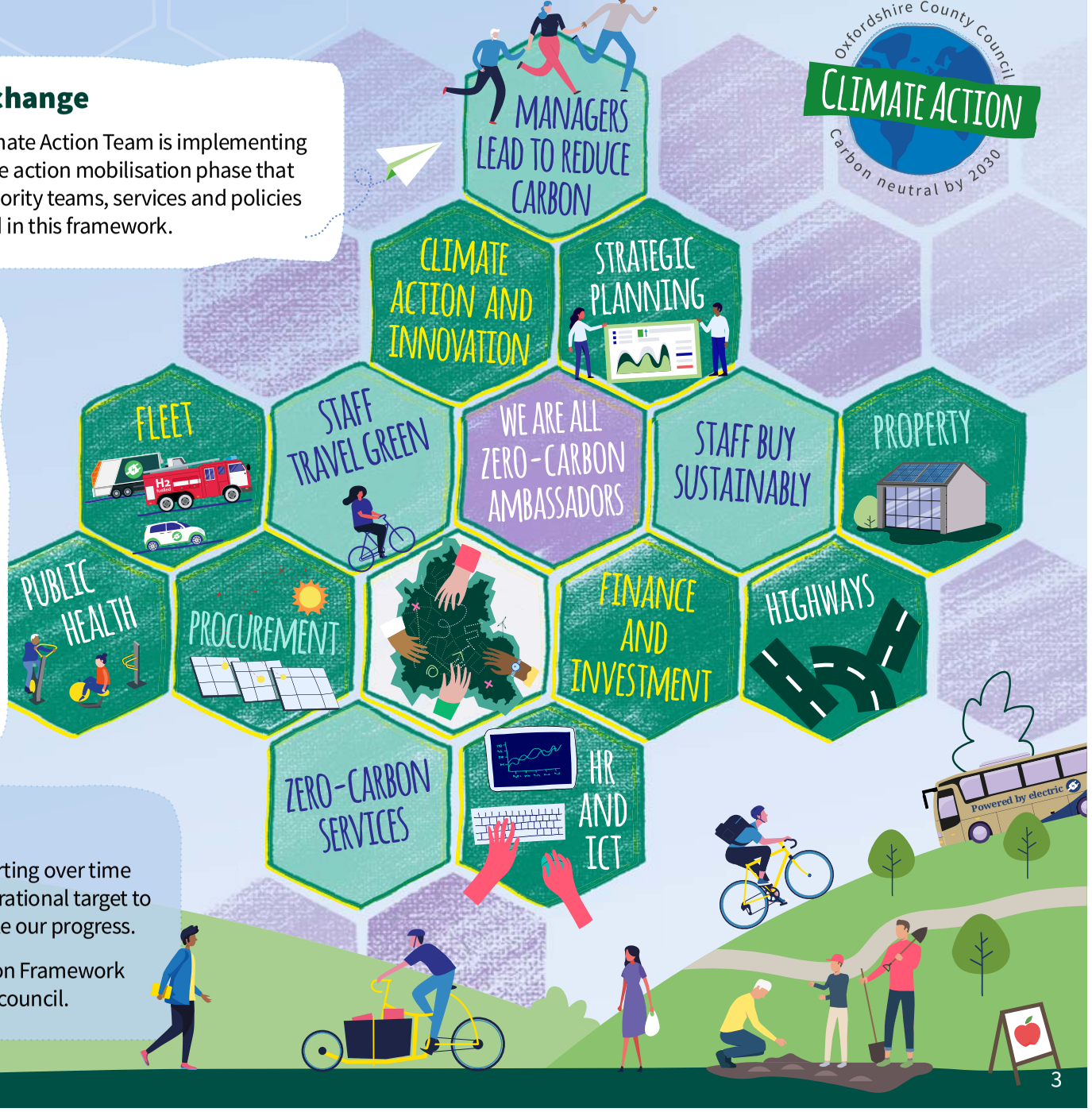
The council's vision and values recognise the importance of climate action to our local prosperity and wellbeing. Supported by our Delivering the Future Together staff development programme we are embedding the skills, tools and culture so that:

- All our staff have the tools to play their role
- Our decisions consider carbon impacts
- Directors and managers have a low-carbon vision for their services
- All staff act as ambassadors for climate action with our partners.

## Holding ourselves to account

We will develop our annual carbon emissions reporting over time to report a wider scope than our 2030 net-zero operational target to help us monitor, evaluate, review and communicate our progress.

We also commit to report against this Climate Action Framework in order to inform future corporate planning in the council.

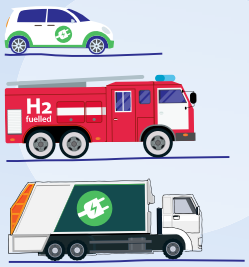



Oxfordshire County Council
CLIMATE ACTION
Carbon neutral by 2030

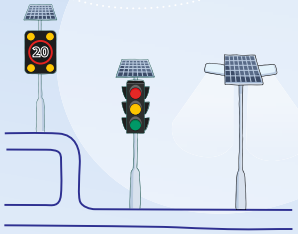
# 2 Operating at net-zero carbon by 2030

## Our commitment

**As your council we are leading the way and are committed to be carbon neutral by 2030 for our major operational footprint.**




**500**
Fleet vehicles, including the fire service




**60,000**
Streetlights, illuminated signs and traffic signals

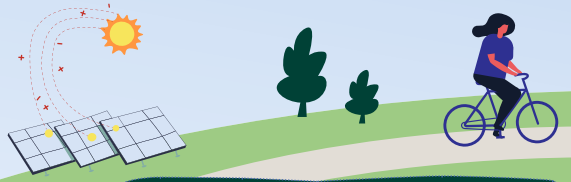
Staff business **mileage**

Energy use in around
**140 buildings**
that the council occupies

## Resilience

The council, residents and business alike have all adapted to the COVID-19 pandemic. We can see that some of these adaptations also reduce carbon emissions. As we emerge, you will see us maintain and build on that resilience by:

- Developing digital connectivity and skills to ensure continuity of services and to reduce travel emissions and support rationalising our estate
- Optimising our property portfolio to avoid unnecessary travel and to focus upon infrastructure necessary to deliver critical services
- Reducing reliance on grid electricity by generating our own clean power and reducing demand.



## Transformation

Residents, businesses, our staff and partners are going to see a very different council. By 2024, the majority of our cars will be electric and by 2028 the same will be true of our vans. Virtual meetings will be the norm and through encouraging active travel, and local pool cars and bikes, by 2030 staff travel by private fossil fuelled vehicles will be the exception.

# 2 Operating at net-zero carbon by 2030

*Reinvigorating our carbon management plan*

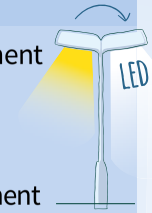
Residents can expect value-for-money from our invest-to-save approach. Business can rely on us to pave the way through research and development partnerships that unlock new opportunities. Everyone can expect us to achieve real carbon emissions reductions: offsetting is an option of last resort.

## Take action now

CONTINUOUS IMPROVEMENT

**Our actions embody an 'energy hierarchy' approach to ensure best value and reduce demand.**

| | |
|---|---|
| **1** Design in energy saving from the outset | • New best practice building design standards adopted<br>• Virtual meetings policy as preference to travel<br>• Encourage and enable effective home working<br>• Increase staff use of active and zero-carbon travel options, particularly e-bikes |
| **2** Energy efficient | • Rigorous building energy management practice introduced<br>• Streetlighting conversion to LED<br>• Purchasing standards introduced to reduce energy demand from equipment |
| **3** Alternative fuel | • Continue implementation of our 'electric default' car and van replacement policy<br>• Support staff to move to transition from fossil to electric cars |
| **4** Generate | • Build the business case for solar on our roofs, land and carparks |
| **5** Buy zero carbon power | • Buy green power for our estate |

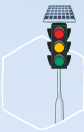



## Plan ahead

CONTINUOUS IMPROVEMENT

**Following our continuous improvement approach we will:**

- Publish a new property strategy to support net zero-carbon buildings and travel
- Develop a new invest-to-save programme to reduce power use in buildings
- Convert traffic lighting to LED
- Optimise streetlighting demand through smart controls
- Introduce electric minibuses
- Identify ways to improve biodiversity and carbon capture on our green estate
- Implement a 'one fleet' management approach to help rationalise fleet
- Investigate opportunities to buy remaining green power direct from a local generator.



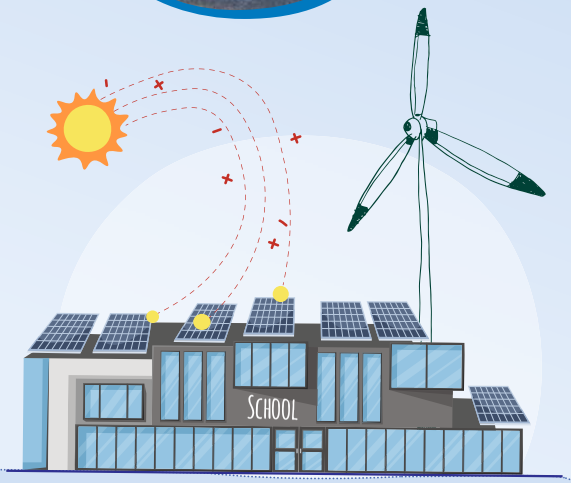
## Pilot, engage government and develop new business models

**Through our Living Lab approach and Innovation Hub, support research and development of:**

- Heat pumps, heat networks and green gas for our buildings
- Low-carbon options for large vehicles e.g. hydrogen
- Smart buildings innovations to improve control
- Digital-first approaches to specialist service delivery
- Battery storage, flexibility and peer-to-peer trading to improve business cases
- Solar-powered street lighting
- Energy service contracts and innovative investment models
- Offsetting that delivers local social value.

# 3 Supporting schools

Protecting the environment is an important part of schools' community values. Maintained schools are responsible for their operations and energy and maintenance budgets, but often lack the resources and capacity to reduce energy costs and carbon. Parents, teachers and pupils can rely on us to support them to address this challenge.




We want schools to be able to set and deliver against their own climate action targets, and to act as ambassadors in their communities. We will act to ensure:

- Schools have support to take action on energy efficiency
- Schools have access to the educational materials needed to engage pupils
- Promote a policy that newly approved schools are built to net-zero standards
- Innovative business models support all schools to generate and store their own energy
- Our services to schools and pupils operate at low carbon and impact e.g. cleaning, catering, maintenance, home to school transport
- We rapidly expand our 'School Streets' approach for more walking and cycling.

# 4 Supply chain

Over 80% of the Council's spend is with our 25 biggest suppliers.

By working with those suppliers, we have the greatest ability to influence the carbons emissions impact of our purchasing and move towards a circular economy.

We spend over £500m a year with suppliers delivering critical services for residents. Creating a new social value policy will lever more benefits from our purchasing and drive the market for low-carbon goods and services, supporting Oxfordshire's high potential low-carbon economy.

For climate action the policy will set a number of minimum expectations from our suppliers whilst allowing the flexibility to drive innovation and higher standards where the market is more advanced. It will:

- Clearly define best practice standards for goods and services
- Require reporting of carbon emissions within suppliers' control (called "direct" or "scope 1 and 2" emissions)
- Include pass/fail sustainability pre-screening questions
- Apply sustainability, innovation and circular economy principles at the outset and in our soft market testing for major contracts.

## SPOTLIGHT ON...

### Our suppliers

Skanska, our highways contractor, is committed to working with Oxfordshire County Council for an accelerated decarbonisation of our highways contract, including taking a range of steps to reduce the embodied carbon in its infrastructure projects.

# How we will achieve it

We will transform our own organisation, support our schools and work closely with our suppliers. By building climate action into every decision, we will become carbon neutral by 2030.

## BUILD THE FOUNDATIONS

- Integrate climate action as a key theme in the council's vision and organisational development review

## TAKE ACTION

- Introduce a climate action toolkit and training programme for staff
- Integrate climate action into the business planning for all services
- Publish emissions reporting

**1**

**A climate active council**

PLAN

ACTION

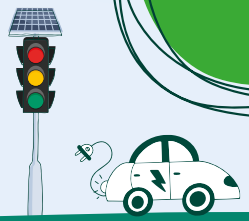
- Publish our property strategy to enable estate rationalisation and enhanced investment to reduce carbon emissions
- Develop an invest-to-save programme for energy efficiency and generation
- Review natural carbon management opportunities on our estate
- Develop approaches to offset delivering local social value
- Pilot 'flexibility' trials under Local Energy Oxfordshire
- Develop traffic lighting and signage conversion programme
- Publish workplace electric vehicle charging strategy
- Release of OCC property to minimise the demand for energy

**2**

**Carbon neutral by 2030**

PLAN

ACTION



- Introduce new corporate building design standards in line with the industry Climate Emergency Design Guide standards
- Buy green electricity for our estate from October 2020
- Deliver our carbon management plan and new annual KPIs by end 2020
- Deliver our streetlighting LED conversion programme
- Continue to roll out our 'fleet to electric' policy
- Mobilise an organisational travel programme
- Introduce a staff incentive scheme to purchase EV
- Develop a "One Fleet" management approach to support rationalisation of fleet

# How we will achieve it

## BUILD THE FOUNDATIONS

- Review our structural maintenance programmes and commercial offers to schools for sustainability opportunities
- Agree approach to reduce carbon in 'home to school' transport
- Further develop and expand a model for installing solar on schools

PLAN

**3**

**Supporting schools**

ACTION

## TAKE ACTION

- Introduce a new support package for maintained schools to reduce carbon
- Introduce new standards for academy builds
- Publish initiatives to accelerate School Streets roll out

- Explore 'smart' approaches to carbon management in supply chain
- Collaborate to introduce climate action 'good practice' terms as part of our partnering with the third sector

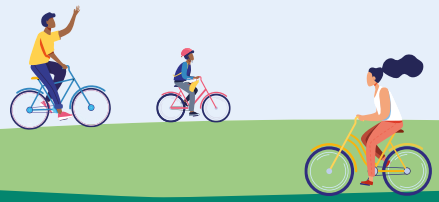
PLAN

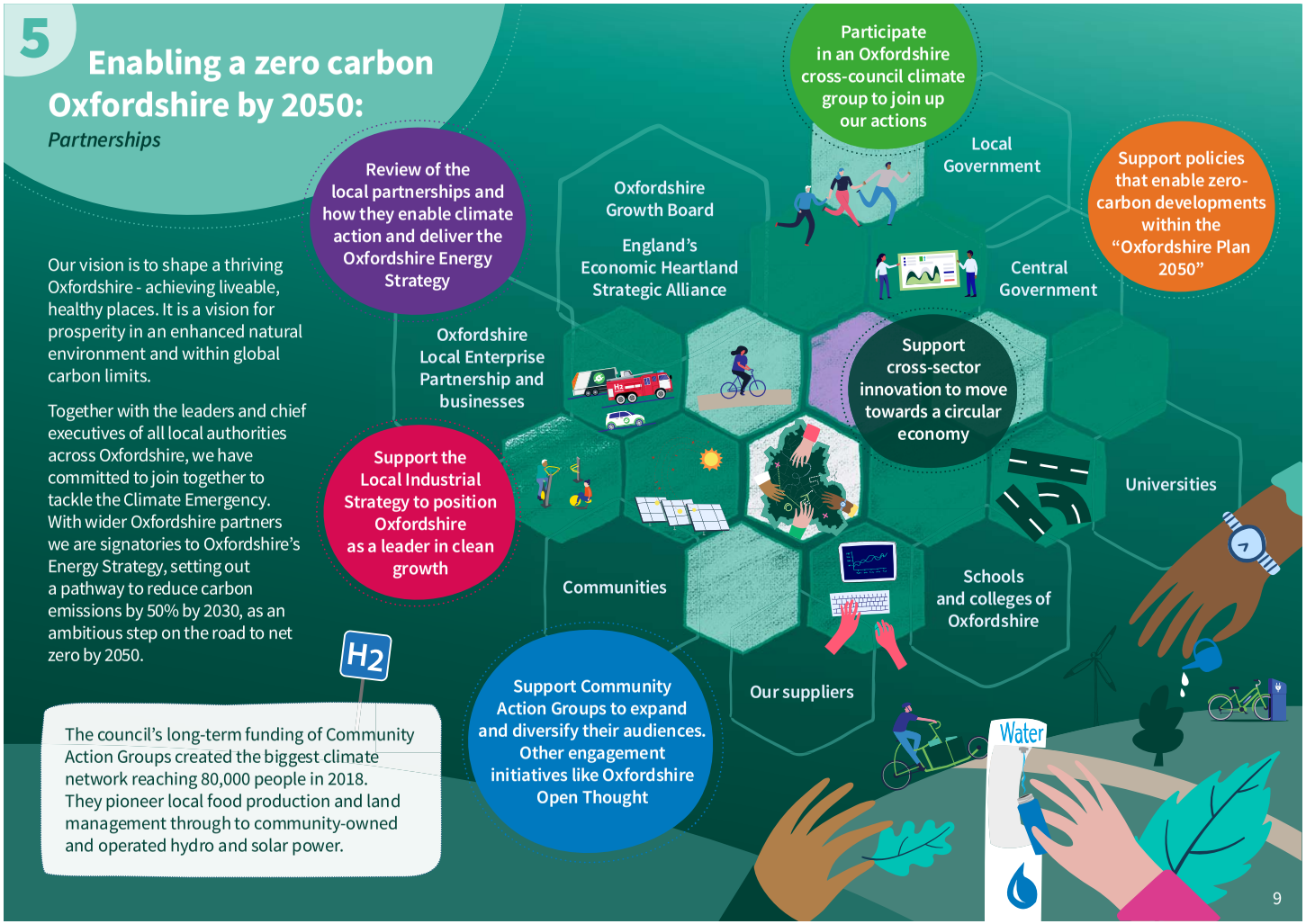
**4**

**Supply chain**

ACTION

- Publish our social value policy to guide future contracts
- Introduce training for our procurement staff and key contract managers
- Produce climate action opportunity plans with key existing suppliers




5
Enabling a zero carbon Oxfordshire by 2050:
Partnerships
Our vision is to shape a thriving Oxfordshire - achieving liveable, healthy places. It is a vision for prosperity in an enhanced natural environment and within global carbon limits.
Together with the leaders and chief executives of all local authorities across Oxfordshire, we have committed to join together to tackle the Climate Emergency. With wider Oxfordshire partners we are signatories to Oxfordshire's Energy Strategy, setting out a pathway to reduce carbon emissions by 50% by 2030, as an ambitious step on the road to net zero by 2050.
The council's long-term funding of Community Action Groups created the biggest climate network reaching 80,000 people in 2018. They pioneer local food production and land management through to community-owned and operated hydro and solar power.
Review of the local partnerships and how they enable climate action and deliver the Oxfordshire Energy Strategy
Participate in an Oxfordshire cross-council climate group to join up our actions
Support policies that enable zero-carbon developments within the "Oxfordshire Plan 2050"
Support cross-sector innovation to move towards a circular economy
Support the Local Industrial Strategy to position Oxfordshire as a leader in clean growth
Support Community Action Groups to expand and diversify their audiences. Other engagement initiatives like Oxfordshire Open Thought
Oxfordshire Growth Board
England's Economic Heartland Strategic Alliance
Oxfordshire Local Enterprise Partnership and businesses
Local Government
Central Government
Universities
Schools and colleges of Oxfordshire
Communities
Our suppliers
H2
Water
9

# 5 Enabling a Zero Carbon Oxfordshire by 2050:

*Energy Strategy*

## Oxfordshire's Energy Strategy

Alongside a range of local partners Oxfordshire County Council is a signatory to OxLEP's Oxfordshire Energy Strategy aiming to:

**1 Secure** a smart, modern, clean energy infrastructure in Oxfordshire

**2 Reduce** emissions by 50% by 2030 setting a pathway to achieving net zero by 2050

**3 Enhance** partnership working across Oxfordshire to focus on energy challenges and financing

## Local Energy Oxfordshire (Project LEO)

LEO is a national demonstrator tackling energy at the community scale: it finds ways to invest in zero-carbon energy solutions that are only possible across multiple homes, schools or businesses.

Oxfordshire's Low Carbon Hub is developing new community-owned energy projects through its Smart and Fair Neighbourhood programme that will be possible thanks to a new local energy trading market developed by Scottish and Southern Energy Networks.

The council will deliver a new spatial 'energy insights' tool to identify potential for generation and energy efficiency across the county.

This strong Oxfordshire coalition involving public sector, community, academia and private sector, is a model for addressing systemic energy challenges.

**It is ambitious. To reduce emissions by 50% by 2030 calls for:**

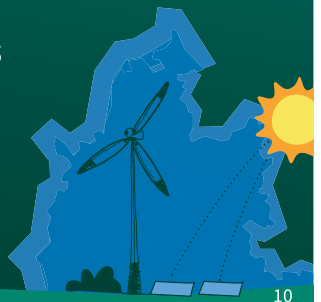
**5 times more** solar power in county

**40% of heating** to be renewable

New housing to meet the highest possible **energy standards**

**Electric and active travel** as the new normal

Retrofitting **4,000 homes** a year to a 'C' standard or higher



It is cross cutting: no single partner owns all the workstreams in the energy strategy. Its goals will be met in the shift to electric transport and heating. The commitment to 100,000 new homes in Oxfordshire by 2030 presents a huge opportunity to deliver on its ambition. The low-carbon investment required is estimated at £300 million annually with the potential to add £1.35 billion annually to the Oxfordshire economy by 2030, creating over 11,000 new jobs.

# 5 Enabling a Zero-carbon Oxfordshire by 2050:

*Build back better*

The pandemic has shown both the adaptability of communities and a growing desire to 'build back better'. As we consider our recovery we look to accelerate our work on climate action in 3 ways:

- **Maintaining positive changes for the long-term**
- **Seeking climate and connectivity investment to support economic recovery and jobs**
- **Focussing on building future resilience:**
  - Supporting a local zero-carbon energy system that moves away from reliance on global fuel markets
  - Enhancing digital connectivity

## SPOTLIGHT ON...

### Resilience and the Circular Economy

A 'circular economy' is one which enhances resilience as we collectively:

- Design out waste and pollution
- Keep products and materials in use
- Regenerate natural systems

The council is just one player and a 'circular economy' inherently depends on the whole system. So, we are committed to learning about the circular economy through our staff development programme. We will improve our ability to spot, support and operate in a way that leads towards this kind of system.

## Investment

The future will not be built on business-as-usual decision making. Central government is reviewing policies and re-prioritising funding, and we will need to do that same, prioritising investment in full fibre connectivity across Oxfordshire as a preference to new roads, active travel over single-occupancy cars, and planning and economic development policies that require the highest design standards from the outset.

We will create the evidence base to review and re-orientate investment towards the objectives of this strategy through a new approach to the Oxfordshire Infrastructure Strategy. Moving to a zero-carbon Oxfordshire will also require substantial new investment – from the private sector and central government. A refresh of the low-carbon economy report for Oxfordshire will help identify the additional finance needed. Our Local Industrial Strategy and energy and transport innovation projects will help to de-risk business models to attract private investment. There will be roles for new partnerships on investment and ownership models. The council's commercial investment strategy already recognises the opportunity to align with energy strategy objectives in the county. We are committed to move to align our treasury investment with environmental and social governance best practice.

# What we want to achieve

Residents and businesses of Oxfordshire can rely on the council to use its strategic policy roles and partnerships to take climate action. For example, through our supporting role in the development the Oxfordshire Plan 2050 (OP2050) which will set out the basis for future planning decisions about housing and infrastructure. Another important policy that the council leads on is the Local Transport and Connectivity Plan.

## Transport and connectivity

**Through our local transport planning role we will:**

- Prioritise digital infrastructure over road building: full fibre broadband across Oxfordshire will replace many journeys
- Increase walking and cycling: it will be accessible and normal
- Enable safe, convenient electric public transport across and between towns
- Accelerate the rise of electric, shared and autonomous travel
- Increasingly deprioritise journeys by single occupancy private car
- Support electrification of rail networks in Oxfordshire.

## Buildings

**By engaging with the city and district councils through OP2050 spatial strategy, and Oxfordshire communities we support initiatives that lead to:**

- Extensive retrofitting of existing buildings
- Increase the proportion of work on fuel poverty delivered through improved building standards
- Net zero-carbon new developments, with high fabric standards, renewables maximised on site and low embodied carbon.

## Infrastructure and systems

**Through our strategic planning and economic development roles, and working as a regional partner we will develop policy, support others, take part in innovation projects and channel our investment for:**

- Smart, flexible, local renewable generation that enhances local resilience identified in strategic planning
- Good design that favours zero-carbon connectivity and low-impact living from the outset
- Enabling electric charging infrastructure accessible for all residents
- Community ownership of energy generation and storage assets.

## Natural carbon management

**Through our planning policies and as a community and regional partner we will ensure Oxfordshire:**

- Takes advantage of 'natural capital' assets such as soils, woodlands, hedges and ponds in order to capture and store carbon and are valued by communities
- Explore the opportunities for protection, conservation and enhancement of carbon capture and storage though our natural environments
- Support the community ambition to double tree cover in Oxfordshire with 'the right tree in the right place', as part of a holistic approach to enhance the county's biodiversity and green infrastructure.

## Waste and consumption

**By leading county-wide partnerships, supporting residents and reviewing our own policies we will:**

- Maximise waste reduction and recycling
- Target zero growth in waste per person
- Work towards assessing whole-system carbon impacts in our waste strategy and seek to influence national policy
- Support both the consumption of healthy and sustainable food, and reducing food waste throughout the supply chain.

# 5 Enabling a zero-carbon Oxfordshire by 2050

## Developing partnerships

- Support Community Action Groups to expand, diversify and collaborate with civil society organisations
- Review partnership options for cross-county working on climate action
- Build upon our strong track record of working with the universities to shape research programme that serve Oxfordshire and lead the world
- Support Living Oxford to leverage Living Labs data and insights

## Investment

- Develop zero-carbon investment options under the commercial investment strategy to support Oxfordshire Energy Strategy
- Review our Property Investment Strategy to account for its contribution to our zero-carbon commitment and to continue to explore ethical, sustainable and good governance investment practices
- Update Oxfordshire's Low-carbon Economy report to provide evidence base to reprioritised infrastructure strategy
- Produce an Environmental, Social and Governance policy for treasury management investments
- Review and plan for the strategic investment requirements of the Oxfordshire Energy and Local Industrial Strategies

## Transport and Connectivity

- Deliver a new Local Transport and Connectivity Plan supporting a zero-carbon ambition
- Implement post-covid schemes to support active travel
- Deliver our Connecting Oxford schemes including the Zero Emissions Zone
- Develop and implement local cycling and walking infrastructure plans
- Pilot low traffic neighbourhoods
- Publish cross-county EV charging infrastructure strategy
- Roll-out up to 300 electric vehicle charge points in over-night charging hubs by 2022
- Support electrification of bus fleet in Oxford

# 5 Enabling a zero-carbon Oxfordshire by 2050

## Infrastructure and systems

- Publish an Oxford Infrastructure Strategy with a new carbon prioritisation on investments
- Develop the Countywide Energy Insights tool for identify renewable and energy efficiency opportunities
- Deliver the Local Energy Oxfordshire (LEO) partnership project and plan for a strategic energy partnership post-LEO

## Buildings

- Support policy for net-zero-carbon development in line with industry best practice in the Oxfordshire Plan 2050
- Support policy identifying sites for strategic renewables in Oxfordshire Plan 2050
- Introduce an Innovation Planning Framework to guide major development
- Support community and social enterprise-led initiatives for zero-carbon, liveable housing developments
- Through LEP, support skills strategies that accelerate a zero-carbon Oxfordshire (eg. jobs to deliver high quality retrofit)
- With partners, review role of 'Oxfordshire bonds' to accelerate investment in retrofit and renewables

## Natural carbon management

- Publish a nature recovery strategy to introduce new policy in the planning system
- Work with partners to launch a tree planting opportunity tool for Oxfordshire and develop funding models to support investment in increasing tree cover
- Introduce biodiversity net gain targets into planning policy

## Waste and consumption

- Work in partnership to deliver the Joint Municipal Waste Management Strategy
- Develop cross-Oxfordshire engagement on the role of 'circular economy'
- Work towards whole system carbon impacts in our waste strategy and seek to influence national policy

**Appendix CL2.29**

**National Highways – PROJECT CONTROL FRAMEWORK (PCF) Newsletter (2022)**

# PCF Newsletter

**December 2022**

PROJECT CONTROL FRAMEWORK

**Number 88**

## Contents and headlines

### Contents


New PCF Product – Page 2

Potential Future Matrix Updates – Page 3

PCF Update/SGAR statistics – Page 4

PCF Training – new dates added – Page 5

MP Drive– Page 5

Changes to NRVAT coming your way– Page 6

Polly Parrot– Page 7

Contact Details– Page 8


### PCF Portal Access

New Accounts – if you require access to our Portal Pages, contact MPPCF@nationalhighways.co.uk

We will need to know which National Highways project you're working on and the NH project manager

Access Issues – in the first instance contact MPPCF Inbox. We will unblock basic access issues and escalate complex issues to our National Highways IT support team. You will be kept up to date with progress where this happens.

### Headlines

**New Matrices for December**

Traditional v62

Single Option v41

**New PCF Product – Carbon Management Report**

This will be a critical product that is produced in Stage 1 and updated in Stages 2-7. It will be part of the Environment Grouping. See page 2 for details

**PCF Assurance Manager role**

We have a vacant PCF Assurance Manager position that is out for recruitment now. If you are interested in joining a great team, please contact a member of the team or send an email to MPPCF@nationalhighways.co.uk.

**Shirley Worrall**

(Standards and Assurance Team Lead) left the team on the 25th November for an exciting new opportunity and said the following –

"It's with sad news I am leaving PCF after 6 years of leading the team, thank you for all the support you have given to me and my team which has supported the development and continuous improvements to PCF.

I have an exciting opportunity to work within the Delivery transformation directorate and look forward to a new challenge"

# New product – Carbon Management Report

A key commitment within the Net Zero Plan is for National Highways to develop a carbon management system for construction and maintenance and to publish it by the end of December 2022. Within Major Projects, we will implement the carbon management system through a new PCF product, the Carbon Management Report, which will be published at the same time.

There are several drivers for developing and implementing our carbon management system:

- The carbon management system is a key commitment for implementing the Net Zero Plan and achieving our stated carbon reduction targets through a standardised, consistent, and transparent approach
- DfT have stipulated that, by 2023, National Highways, along with all of its' arm's length bodies must implement a carbon management system, which is accredited to PAS 2080 Carbon Management in Infrastructure
- DfT have mandated that, by the end of 2022, all Tier 1, 2 and 3 projects must report their whole life carbon. Projects are already required to report whole life carbon, in accordance with the requirements of DMRB Standard LA114: Climate
- There is a significant risk of projects failing to secure consent due to their carbon footprint. The carbon management system and the Carbon Management Report product will ensure that carbon is considered throughout the project lifecycle, including at the early stages when there is the greatest potential to reduce carbon, reducing the risk of challenges relating to construction related emissions.

As a result, in June 2022, the Executive agreed carbon reduction targets for construction and maintenance activities, based upon their expected completion date. Each project is expected to put in place a plan to achieve their target and to monitor and report progress throughout the project lifecycle.

The need to quantify and report carbon is not new. As noted above, projects are already required to calculate their carbon footprint at each project stage in line with LA114, identify carbon reduction interventions and record what has been considered and taken forward. During construction the supply chain already reports via the National Highways' Carbon Reporting Tool. However, there is a lack of consistency between projects and the level of compliance with existing requirements varies greatly, partly due to a lack of standard assurance processes.

The new Carbon Management Report product provides a consistent approach to carbon quantification and management across Major Projects, ensures carbon reduction is considered as a core part of the decision-making process throughout the project lifecycle, and is underpinned by the governance and assurance provided by the PCF framework.

Without the new Carbon Management Report product to formalise the requirements and provide a consistent approach across Major Projects, we are unlikely to achieve our carbon reduction goals, risk working inefficiently and may fail to share good practice across projects and the supply chain.

**Appendix CL2.30**

**Climate Change Committee – Seventh Carbon Budget – Call for Evidence**

Climate Change Committee

The UK's independent adviser on tackling climate change

Climate Change Committee
1 Victoria Street,
Westminster, London,
SW1H 0ET
w theccc.org.uk

# Call for Evidence

We are seeking views to inform our advice on the UK's Seventh Carbon Budget, Wales's Fourth Carbon Budget and Northern Ireland's Fourth Carbon Budget[1]. This call for evidence closes on the **16th January 2024.**

**Introduction**

Welcome to the CCC's call for evidence to inform our advice on the UK's Seventh Carbon Budget (2038-2042), Wales's Fourth Carbon Budget (2031-2035) and Northern Ireland's Fourth Carbon Budget (2038-2042).

We welcome individuals, organisations and representative bodies to submit evidence via answering any of the thirteen questions.

Our methodology is explained in the CCC's "Proposed methodology for the Seventh Carbon Budget advice", which can be found on our webpage.

All of the questions state their corresponding section in the CCC's 'Proposed methodology for the Seventh Carbon Budget advice', have a 500-word limit and a multi-select option that indicates whether the submitted answer is general or only relevant to particular sector(s) - please use this to ensure your answer goes to the correct place. Please upload evidence, in Word or PDF format (maximum size 8 megabytes), that supports your answers via the 'Further evidence' option on each question. We particularly welcome references to robust and independent studies and international examples of good practice.

The call for evidence closes on the **16th of January 2024** after which we will consider the answers before finalising the methodology underpinning our advice. We intend to publish every response we receive unless explicitly requested not to. As a public body, Freedom of Information legislative requirements and Environmental Information Regulations apply to all data held by the CCC.

Thank you in advance for your contributions.

Please read the CCC's "Proposed methodology for the Seventh Carbon Budget advice" before answering the following questions.

**Questions**

1. Pathway considerations:

Have we captured the main technological, social, economic and commercial factors we should be considering in our pathways? Do you have any evidence for barriers in specific sectors and technologies?

[1] Scotland already has its future interim decadal targets in law (for 2030 and 2040) as well as annual targets and a Net Zero by 2045 target. This Call for Evidence will be used to inform any future advice related to these targets.

Twitter: @theCCCuk

2. Additional Action Pathway and contingency plans:

What types of government measures do you think should be included in the Additional Action Pathway and/or as contingency options rather than in the Balanced Pathway? Please explain why.

3. Uncertainty:

Are there any major sources of uncertainty that should be considered in our uncertainty analysis? For example, for which technologies are costs or performance likely to be particularly uncertain?

4. Speculative technologies:

In our carbon budget advice, we take a low-risk approach by avoiding reliance on speculative technologies, to ensure that our pathways are deliverable[2]. Is there any new evidence on the feasibility of technologies that support decarbonisation since our 2020 advice on the Sixth Carbon Budget that we should consider?

5. Reduction in high-carbon activities and choices:

What are the main factors we should consider when assessing a potential shift in patterns of travel and diet in our Balanced Pathway and our Additional Action Pathway?

6. Considerations for Scotland:

What are the distinctive characteristics that should be considered when developing pathways and costs for Scotland?

7. Considerations for Wales:

What are the distinctive characteristics that should be considered when developing pathways and costs for Wales?

8. Considerations for Northern Ireland:

What are the distinctive characteristics that should be considered when developing pathways and costs for Northern Ireland?

9. Whole-economy costs and benefits:

What are the most important elements of impacts on the economy and competitiveness that should be considered in our assessment?

10. Social impacts and distributional analysis:

What are the most important elements of social impacts and the distribution of costs and benefits society that should be considered in our analysis?

11. Methodology:

Are there any key methodological issues we have missed or, in your view, are mistaken for our Seventh Carbon Budget advice?

12. Engagement:

How best can we engage with experts and stakeholders to build our evidence base and test our emerging thinking?

13. Sharing our advice:

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[2] We do include technologies that have significant cost and performance uncertainties, for example Carbon Capture and Storage (CCS), Direct Air Carbon Capture and Storage (DACCS) and hydrogen.

What would help make our advice accessible to wider stakeholders, such as citizens, financial institutions, businesses and local government? For example, video explainers, stakeholder specific briefings or social media threads.