

# Infrastructure Progress Review 2023



NATIONAL  
INFRASTRUCTURE  
COMMISSION

Better infrastructure for all

March 2023

## Our remit

The Commission provides government with impartial, expert advice on major long term infrastructure challenges.

The Commission's objectives are to:

- support sustainable economic growth across all regions of the UK
- improve competitiveness
- improve quality of life
- support climate resilience and the transition to net zero carbon emissions by 2050.

In fulfilling our purpose and objectives, we:

- **set a long term agenda** – identifying the UK's major economic infrastructure needs, and the pathways to address them
- **develop fresh approaches and ideas** – basing our independent policy recommendations on rigorous analysis
- **focus on driving change** – building consensus on our policy recommendations, and monitoring government progress on their delivery.

A fuller description of the Commission's remit can be found on our website at [nic.org.uk/about/what-we-do/](https://nic.org.uk/about/what-we-do/). This includes a table of devolved administration responsibilities by infrastructure sector.

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# Contents

|                                      |    |
|--------------------------------------|----|
| Foreword .....                       | 4  |
| Executive summary .....              | 5  |
| Approach to reviewing progress ..... | 16 |
| Digital .....                        | 19 |
| Transport.....                       | 27 |
| Energy .....                         | 41 |
| Floods resilience.....               | 54 |
| Water .....                          | 61 |
| Waste .....                          | 68 |
| Cross cutting .....                  | 74 |
| References.....                      | 86 |

# Foreword

The task of this annual review is to assess progress towards implementation of the Commission's past recommendations adopted by government.

In doing so it would be remiss not to take a wider view on progress towards major infrastructure objectives government has set itself, and behind which there is broad political consensus – such as creating a net zero economy by 2050 and promoting economic growth across all regions of the UK.

These goals require huge public and private investment over a sustained period.

During 2022 there were some steps forward: greater devolution to West Midlands and Greater Manchester to implement their own ambitious infrastructure strategies, and progress to keep the UK on track to achieve nationwide coverage of gigabit broadband by 2030.

But if the Commission saw 2021 as a year of slow progress in many areas, in 2022 movement has stuttered further just as the need for acceleration has heightened. There have been negligible advances in improving the energy efficiency of UK homes, the installation of low carbon heating solutions or securing a sustainable balance of water supply and demand.

The risk of a mixed scorecard is that readers take their pick based on their own experiences or purposes. Residents in the north of England, for instance, could hardly be blamed for focusing on the appalling state of current rail services within and between the places pivotal to supporting growth. Others will cheer the further expansion of cheap renewable energy generation at a time of severe concerns about energy security and the high costs of fossil fuels.

But taking a strategic view on the recent pace of planning and delivery suggests a significant gap between long term ambition and current performance. To get back on track, we need a change of gear in infrastructure policy.

This means fewer low stakes incremental changes and instead placing some bigger strategic bets, backed by public funding where necessary – after all, the risk of delay in addressing climate change is now greater than the risk of over correction. We must have the staying power to stick to long term plans, to spare cost increases that come with a stop-start approach and to give investors greater confidence in the UK. We must also accelerate and expand the devolution of power and funding to local leaders, who are best placed to identify their infrastructure needs and economic opportunities.

Getting our infrastructure right for the second half of this century is a journey that, by definition, will go on being plotted over the coming decades. But a further year of prevarication risks losing momentum on critical areas like achieving the statutory net zero target. Rarely has the need for speed been more evident.

**Sir John Armitt, Chair**



# Executive summary

**Government has ambitious goals for infrastructure, but in many areas, it is not delivering fast enough. The United Kingdom faces long term challenges, from slow economic growth to delivering net zero. To meet these, government needs a long term infrastructure policy that it consistently delivers on. This document sets out a detailed review of progress over the last year against the Commission's previous recommendations.**

The UK economy faces long term challenges. Economic growth in the UK economy has slowed in recent decades. Despite positive progress, much more action is needed to tackle climate change. Economic infrastructure can play a key role in overcoming these challenges. Effective infrastructure can support growth in the economy by cutting costs and better connecting people and places. Decarbonising key sectors such as power, heat, and transport is critical to meeting climate targets; around two thirds of the country's greenhouse gas emissions come from economic infrastructure.

Government's progress on implementing the Commission's recommendations this year has been too slow. Positive progress has been made in rolling out gigabit broadband, increasing the amount of renewable electricity generation, continuing to implement further devolution, and developing plans to increase water supply. But in a range of other areas government is off track to meet its targets and ambitions: more uncertainty has been created around the timeline for delivering High Speed 2, energy efficiency installations are too low, comprehensive policy is not in place to meet the government's target on decarbonising heating, the National Policy Statements for energy have still not been updated, recycling rates continue to plateau, and per person water consumption remains too high.

To get back on track the Commission recommends government embed four key principles in its policy making over the next year:

- develop staying power to achieve long term goals
- fewer, but bigger and better interventions from central government
- devolve funding and decision making to local areas
- remove barriers to delivery on the ground.

## The country faces economic challenges

Slow growth of the country's economy has been a persistent issue in recent decades. The UK's average annual growth in Gross Domestic Product since the 2007-2008 financial crisis has been one per cent, compared to 2.5 per cent in previous decades.<sup>1</sup> Since the early 2000s, UK productivity has fallen further behind comparator countries such as France, Germany, and the United States.<sup>2</sup> Alongside this, the UK economy also continues to suffer from profound and persistent regional inequalities.<sup>3</sup> London is the only major city in the UK that has above average productivity.<sup>4</sup> Although even in London, productivity growth has slowed significantly since the financial crash.<sup>5</sup>

Part of the reason for the UK's slow growth is low levels of investment.<sup>6</sup> Since 1980, the UK has invested, as a share of Gross Domestic Product, less than comparator countries such as France, Germany, and the United States.<sup>7</sup> Ambitious and stable policy from government, alongside effective regulation, is needed to facilitate private sector investment in the country's key infrastructure sectors. Improving governance structures by enhancing devolution and removing barriers in the planning system will ensure increased investment is spent wisely and quickly.

Low levels of investment are also a challenge for reaching net zero. To meet its legally binding climate targets, the UK must reduce its overall greenhouse gas emissions by 78 per cent compared to 1990 levels by 2035, and to net zero by 2050. This will require significant investment across a whole range of activities, from heating homes to driving cars. Doing so will also help keep the UK at the forefront of international competition in some areas. Over 130 countries, comprising over 90 per cent of global gross domestic product, now have a net zero target set or under discussion.<sup>8</sup>

Recent years have also demonstrated the challenges of underinvestment in resilience. Heatwaves in 2022 exposed fragility in the UK's water resources, and labour shortages and extreme weather events have disrupted the rail network. Many of these risks will become more severe in the face of a changing climate, and action to enhance resilience is becoming more pressing.

## Infrastructure is a key part of the solution

Good infrastructure facilitates growth.<sup>9</sup> Improving the quantity and quality of infrastructure services will lower costs for households and firms in the medium to long term. Transport and digital infrastructure support efficient housing and labour markets, allowing people to live and work in different locations.<sup>10</sup> And infrastructure also directly enables productivity enhancing technological change, for example better mobile and broadband networks were critical for the emergence of new online services. Tackling long standing regional economic disparities will also require increased investment in infrastructure.<sup>11</sup>



Moreover, large scale investment in infrastructure, both public and private, is essential to achieving a net zero economy. In the UK, climate change is primarily an economic infrastructure challenge, with two thirds of emissions coming from the six sectors in the Commission's remit. Estimates from the Climate Change Committee suggest up to £50 billion of investment will be needed each year for the next 25 years for the UK to reach net zero.<sup>12</sup> Further investment will also be needed to increase resilience and adapt to the growing risks from flooding and drought driven by climate change.

## Ambitious long term targets

In 2018 the Commission published the first *National Infrastructure Assessment*. This identified the country's long term infrastructure needs and set out a series of actions for the government to take to secure the required investment. The Commission has followed the *National Infrastructure Assessment* with other studies containing recommendations across many infrastructure challenges.

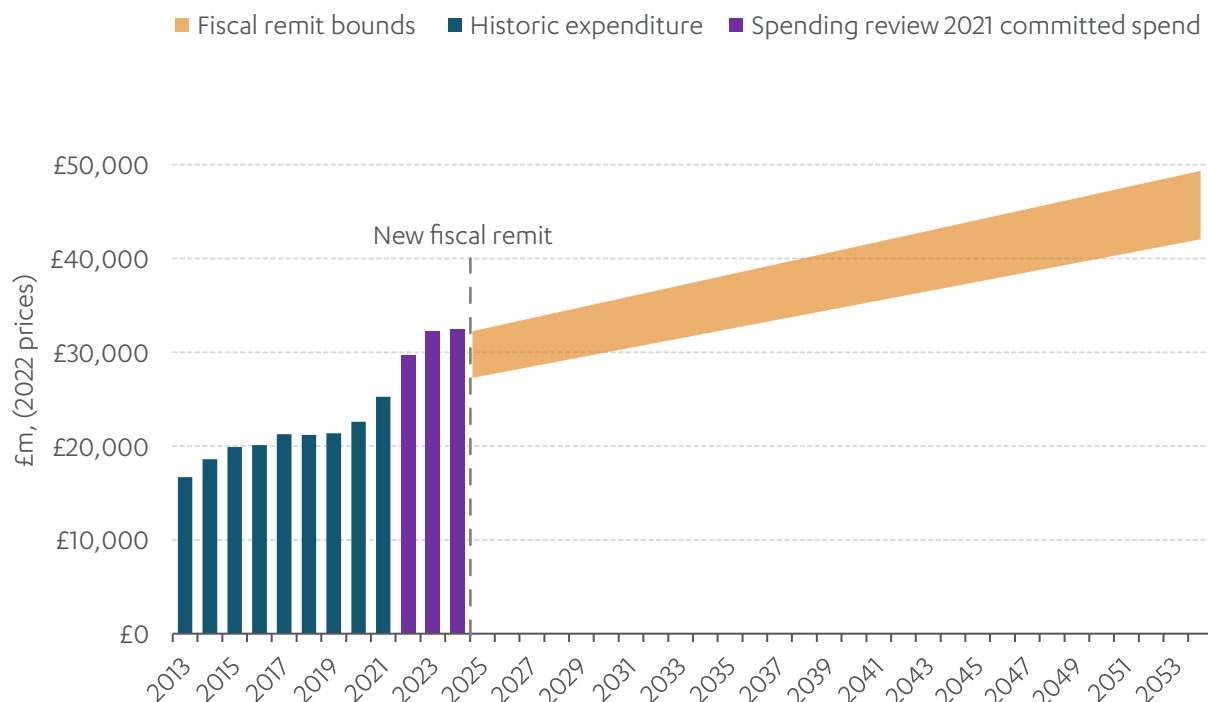
The National Infrastructure Strategy, published in 2021, is a detailed and comprehensive approach to infrastructure policy responding to the Commission's Assessment. It set out a series of policy decisions intended to support growth and put the UK on the path to a net zero economy. The Strategy was intended to endure, aiming to tackle entrenched policy challenges with a long term approach. As HM Treasury argue: "stronger economic growth requires a long term plan and commitment to see it through – there are no quick fixes to the challenges the UK faces."<sup>13</sup>

The government has built on the National Infrastructure Strategy with other key strategies and has now set clear long term goals in many critical areas. The Net Zero strategy was published in 2021, the Environment Act was passed in 2021, and the Levelling Up White Paper and subsequent Bill set out a series of key missions to deliver over the next decade.

At the 2021 Spending Review, the government backed these high level ambitions with a funding commitment of £100 billion to support economic infrastructure from 2022-23 to 2024-25. This was re affirmed at the 2022 Spending Review (figure 1). However, over the last two decades government has frequently under delivered on spending commitments; it is critical this time that it follows through.<sup>14</sup> The government has signalled a longer term commitment to investing in economic infrastructure by increasing the Commission's fiscal remit, the technical guidance on how much public investment the Commission can recommend, to 1.1 – 1.3 per cent of GDP each year from 2025 to 2055 (figure 1).

## Figure 1: Government is increasing spending on infrastructure in the short term, this must continue in the long term<sup>15</sup>

*Historic public expenditure on economic infrastructure 2013 to 2021, spending review commitments, and the Commission's fiscal remit*



Source: Commission calculations, HMT Public Expenditure Statistical Analyses (2022)

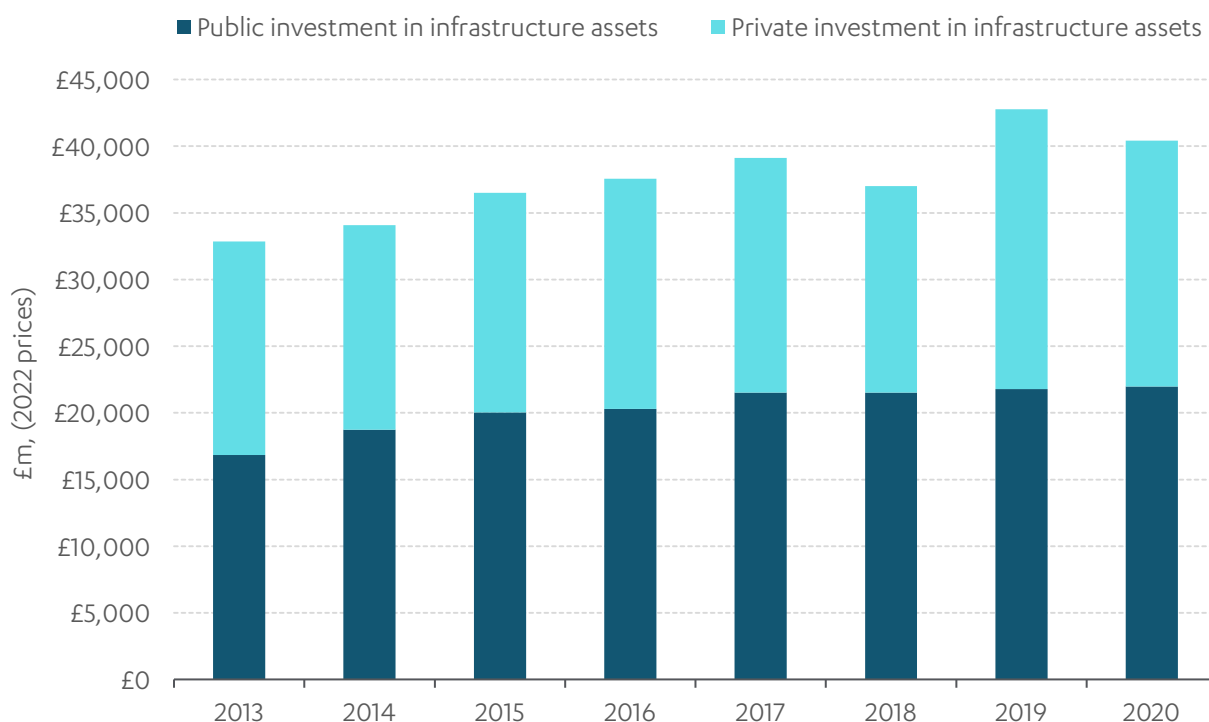
**Note:** Spending review 2021 committed spend of £100 billion is profiled based on department capital budgets set out in Office for Budget Responsibility's March 2023 economic and fiscal outlook

Private sector investment is also critical for meeting the government's long term targets on infrastructure. In recent years, public and private investment in economic infrastructure assets has been broadly similar, with annual public investment around £20 billion and private sector investment around £18 billion (figure 2). The UK must remain an internationally competitive place to invest, at a time when the Inflation Reduction Act in the United States and the REPowerEU plan and Net-Zero Industry Act in the European Union make the investment environment more challenging. Ambitious and stable policy from government, alongside effective regulation, is critical for providing the private sector with the certainty it needs to invest.



## Figure 2: Public and private sector investment in infrastructure assets is broadly equal<sup>16</sup>

*Public and private sector investment in infrastructure assets, 2013 to 2020*



Source: Commission calculations

**Note:** Private investment excludes data for the Waste sector, and is considered unreliable pre-2019 as it excludes private capex for the Digital sector. Public and private investment in aviation and shipping is excluded

## More consistent delivery from government is needed

The elements needed for successful delivery of the Commission's recommendations and government's ambitions are not currently all in place. Progress is being made. But significantly more action is needed to meet the Sixth Carbon Budget; carbon emissions need to fall from 447 MtCO<sub>2</sub>e in 2021 to 190 MtCO<sub>2</sub>e by 2035. Progress on delivering the ambitions set out in the Levelling Up White Paper is currently too slow. And barriers on the ground, such as the planning system, are slowing deployment across the board.

More detail on the Commission's review of progress against its recommendations and government's commitments in each of the key sectors within its remit is summarised below.

### Digital

The government has made a genuine commitment to improve digital connectivity across the country. Delivery of gigabit capable broadband networks is progressing rapidly and, in 2022, gigabit capable coverage was extended to over 70 per cent of premises. This reflects significant increased investment from operators in recent years. If operators deliver on their published plans, and government maintains the £5 billion subsidy programme for under served areas, government will likely achieve its target to deliver nationwide coverage by 2030.

On mobile, 4G coverage from at least one operator now extends to around 92 per cent of the UK landmass, and the Shared Rural Network agreement should increase this to 95 per cent by 2026. However, challenges remain on securing investment for upgrading coverage on the rail networks.

Government must now set out a clear vision for 5G mobile networks in the upcoming Wireless Infrastructure Strategy. The long term commercial and strategic value of 5G will be determined by whether it becomes more than just a faster version of 4G, and whether it provides solutions to pressing problems.

## Transport

The Commission has consistently recommended that local areas be given long term funding settlements for transport to aid planning and have greater control over investment. Moving away from the damaging system of competitive bidding for grant funding that erodes local capacity is critical.

Some progress has been made over the last year, including taking forward the commitment from the Levelling Up White Paper to transfer new powers, funding, and responsibilities to City Regions. The trailblazer deals and single multi year budgets announced for Greater Manchester and West Midland Combined Authorities are exemplars. The commitment to provide a second five year funding deal for England's largest Mayoral City Combined Authorities for 2027-28 to 2031-32 will support long term planning. However, devolution must stretch across the whole country not just to major city regions. Progress empowering local authorities and helping them build capacity and capability must continue.

The government has committed to supporting the West Yorkshire Combined Authority to plan and build a mass transit system at an indicative cost of around £2 billion. While this is positive, it falls short of the ambition for major urban transport investment the Commission set out in the *National Infrastructure Assessment*.

Progress on major transport projects connecting major cities is mixed. The Integrated Rail Plan provided clarity with a long term plan for rail in the North and Midlands. It included a commitment to invest £96 billion to build new high speed lines and upgrade and electrify existing lines. Recent delays to delivery of High Speed 2 will inevitably delay the benefits of greater connectivity that are crucial to the economies of the North and Midlands – government must act to create a greater sense of certainty around the whole project and ensure that there are no delays to the current timetable for High Speed 2 services reaching Manchester. Action on the Cambridge-Milton-Keynes-Oxford arc remains slow and the government's long term commitment to the road infrastructure needed to unlock growth in the region is unclear. If this does not change, the country will miss a significant growth opportunity.

Transport remains far too carbon intensive. In 2021, emissions from surface transport were 101 MtCO<sub>2</sub>e. This needs to fall to around 30 MtCO<sub>2</sub>e by 2035 to meet the Sixth Carbon Budget. In 2022, government published critical strategies on decarbonising road transport, which support the government's expectation of 300,000 public charge points and near 100 per cent electric

car and van sales by 2030. But only 37,000 public charge points are currently installed. There are just eight years left to meet government's target; a rapid increase in electric vehicle charge point installations is now needed to support the adoption of zero emissions vehicles.

## Energy

The UK is too reliant on natural gas: a high cost, high carbon, and insecure source of energy. In 2022, the sharp rise in gas prices prompted by Russia's invasion of Ukraine increased the cost of energy and jeopardised security of supply. The government is now directly subsidising the energy consumption of households and businesses, setting prices for the average household at £2,500 per year between October 2022 and June 2023. Relying on natural gas for electricity and heating leaves the energy system far too carbon intensive. In 2021, emissions from the power and heating system were 135 MtCO<sub>2</sub>e, this needs to fall to around 50 MtCO<sub>2</sub>e by 2035.

The Commission recommended that the UK should have a highly renewable electricity system, and good progress continues to be made delivering this. In 2022, 40 per cent of electricity was generated by renewables, up from around ten per cent a decade earlier. This has been driven by the government maintaining its contracts for difference policy, which provides revenue certainty and de risks investment. Renewable electricity, through offshore wind, onshore wind and solar, is now cheaper than producing electricity with natural gas. However, there are only twelve years to realise the government's aim of a decarbonised electricity system by 2035. Barriers to further renewables deployment, such as securing transmission grid connections, must urgently be addressed to stay on track.

Little progress has been made on energy efficiency or heat this year. A concrete plan for delivering energy efficiency improvements is required, with a particular focus on driving action in homes and facilitating the investment needed. And while the government has set targets for decarbonising heating, these are not backed up by policies of sufficient scale to deliver the desired outcomes. Key policies remain missing, and government funding is insufficient to deliver the required change. In 2021, over 1.5 million gas boilers were installed. The government has set an ambition for at least 600,000 heat pumps to be installed each year by 2028, but only around 55,000 were installed in 2021. Unless the growth rate of installations increases significantly, the 600,000 heat pump installation target will be missed. These challenges must be urgently resolved to meet the Sixth Carbon Budget.

## Flood resilience

Around two million homes and properties in England are in areas at risk of flooding from rivers and the sea, and climate change means the risk is growing. In line with the Commission's recommendations, government investment in measures to reduce the risk of flooding has doubled and policies have been revised to emphasise catchment based planning, green infrastructure, and property level resilience. But government has yet to specify measurable long term targets for flood resilience. Until it does so, policies and investment are unlikely to fully address the flood risk challenges the Commission identified in the first Assessment.

Last year, the Commission published a study on surface water flooding. Over three million properties are currently at risk of suffering surface water flooding, and 325,000 are at high risk with at least a 1 in 30 chance of flooding every year. In the coming decades the number of properties in areas that are high risk could increase by up to 295,000, due to growing risks from climate change, new developments increasing pressure on drainage systems and the spread of impermeable surfaces from paving over gardens. The report sets out the need to better identify the places most at risk and reduce the number of properties at risk. This will mean devolving funding to local areas at the highest risk and supporting them to make long term strategies to meet local targets for risk reduction. The Commission expects government to respond to these recommendations this year.

## Water

The drought of summer 2022 demonstrated the risk of water shortages due to climate change and population growth. In the first *National Infrastructure Assessment*, the Commission recommended addressing the growing risk of water shortages through a ‘twin track’ approach: to reduce demand and increase supply. To deliver this, the Commission called for ambitious targets for leakage reduction, compulsory smart metering, the creation of additional supply and a national water transfer network.

If implemented, industry plans are ambitious enough in scale to meet the Commission’s recommendations on leakage and new supply. And some progress has already been made, with leakage rates have fallen from around 3085 mega litres per day in 2017-18 to 2755 mega litres per day in 2021-22. However, there is still a long way to go to meet the target of reducing leakage by 50 per cent by 2050. To meet ambitions on supply, current plans suggest that at least twelve nationally significant infrastructure projects will need to be consented by 2030, so it is critical the planning system is fit for purpose and progress is made rapidly.<sup>17</sup> Longer term demand reduction is dependent on government action, and it is not clear that current government policies on water efficient homes and water efficient product labelling are sufficient to achieve the 110 litres per person per day consumption target by 2050.

## Waste

Government must do more to increase waste recycling rates. The Resources and Waste Strategy and the Environment Act 2021 indicated an ambition to incinerate less and recycle more. In line with the Commission’s recommendations, government set targets to recycle 65 per cent of local authority collected waste by 2035, 62 per cent of plastic packaging by 2030, and achieve universal food waste collection by 2025. However, despite having clear overall targets, recycling rates have stagnated since the mid 2010s: local authority collected waste recycling rates have plateaued at around 40 per cent, as have plastic packaging recycling rates, and only around 40 per cent of local authorities currently have separate food waste collections. Unless clear rollout plans are now put in place, these recycling targets will be missed, and the sector will remain a major source of carbon emissions.

## Getting back on track

To get back on track, government needs to take a more consistent and committed approach to policy and delivery. Government's infrastructure ambitions are essential. But they are also challenging to deliver.

The Commission recommends that going forward, government should embed four key principles in its approach to infrastructure policy making:

- **Develop staying power to achieve long term goals.** Continued chopping and changing of infrastructure policy creates uncertainty. This uncertainty creates a cost for business and delays or deters investment. For example, government's stop start approach to energy efficiency policy has led to low rates of installations over the past decade; and uncertainty associated with the future of the Cambridge-Milton Keynes-Oxford growth arc has likely inhibited growth and deterred inward investment. In contrast, where government has created policy stability, investment has followed. For example, the contracts for difference mechanism has provided certainty to developers and resulted in rapid deployment of renewable electricity generation. Similarly, government's stable policy on broadband, alongside network competition, facilitated significant investment leading to gigabit capable coverage increasing from five per cent of premises in 2018 to over 70 per cent of premises in 2022. Government must create greater certainty around key projects, such as High Speed 2, to follow through on its long term goals.
- **Fewer, but bigger and better interventions from central government.** Meeting the challenges of net zero requires clear strategic focus. The need for rapid progress to tackle climate change is becoming ever more apparent; the risk of delay is now bigger than the risk of building more infrastructure than is needed. But government continues to expend too much effort on many small scale funding interventions and repeated consultations, trying to maintain optionality in all areas. This leaves key strategic policies — such as business models for hydrogen and carbon capture and storage, taking a decision on the role of hydrogen for heating, and putting policy in place for getting off gas — unfinished. Going forward, government will need to take some strategic bets; such as the recent commitment to £20 billion funding to support key new energy technologies.<sup>18</sup> Making small steps forward in all directions will not bring about the scale of change in infrastructure needed to meet the Sixth Carbon Budget and deliver a net zero economy. Government must now focus on the small number of areas where it can have a big impact and make bold decisions.
- **Devolve funding and decision making to local areas.** Long term planning and funding decisions taken at the right spatial level will better reflect local economic and social priorities and avoid distorted incentives created by pursuing myriad national grants. Evidence suggests that with good quality institutions and limited fragmentation across economic areas, devolution is positively associated with productivity and growth.<sup>19</sup> Moreover, devolving decision making allows central government to stay more focused on key national priorities. Government has committed to extending and simplifying devolution across the country and giving local leaders greater control over how funding is spent. Where progress has been made, for example with the

extension of Metro Mayors, positive impacts are being seen. The trailblazer deals and single multi year budgets announced for Greater Manchester and West Midlands Combined Authorities are exemplars. Government must complete the move away from competitive bidding processes and implement flexible, long term devolved budgets for all local transport authorities. The missing link is fiscal devolution and allowing greater revenue raising powers at a local level. Local leaders should be able to fund as well as find their own local infrastructure solutions. This would create stronger economic incentives to drive local economic growth and provide resources for city regions and Mayoral Combined Authorities to contribute to the costs of improving local infrastructure. The Commission is looking at the scope for transport user charges to support local transport infrastructure – and this principle could be applied to areas such as business rates growth retention.

- **Remove barriers to delivery on the ground.** The planning system for handling nationally significant infrastructure projects has slowed in recent years, with the timespan for granting Development Consent Orders increasing by 65 per cent between 2012 and 2021.<sup>20</sup> Not only does this mean that much needed infrastructure is not getting delivered, but it also adds significant cost which will ultimately be paid for by consumers and taxpayers. The system needs to return to the situation in 2010 where projects were typically taking two and a half years to achieve consent.<sup>21</sup> Recent publication of the draft National Networks National Policy Statement is a step in the right direction. Government must now publish the final National Policy Statement for Energy. Decarbonising the electricity system will require over 17 transmission projects to receive development consents in the next four years, a fivefold increase on current rates.<sup>22</sup> The Commission will publish its study on the infrastructure planning system shortly and the Commission hopes government will rapidly progress its recommendations.

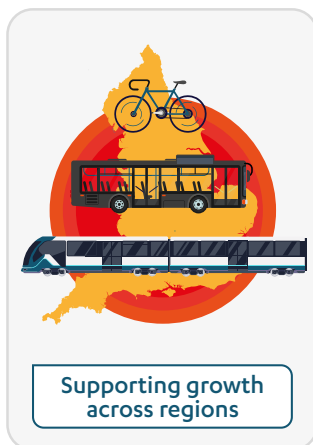
Alongside these four key principles to embed in policy making, the Commission is calling on government to progress ten actions over the next year (figure 3, next page). These actions will help get government back on track to delivering the Commission's recommendations and tackling the challenges of net zero, regional growth, and climate resilience.

## The next National Infrastructure Assessment

Later this year the Commission will publish the second *National Infrastructure Assessment*. This will set out a series of further recommendations for government to meet the challenges of delivering growth across regions, meeting net zero, and enhancing climate resilience and the environment.



**Figure 3: government actions for the year ahead**



Move away from competitive bidding processes to give local areas more flexibility and accountability over economic growth funds, and implement flexible, long term devolved budgets for all local transport authorities

Demonstrate staying power by progressing the Integrated Rail Plan for High Speed 2 and Northern Powerhouse Rail and remaining committed to the £96 billion investment required

Follow through on commitments made in 2018 to the Cambridge-Milton Keynes-Oxford growth arc, by setting out how the road and rail infrastructure to support new houses and businesses will be delivered

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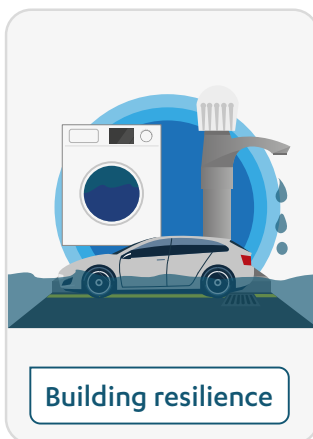
Deliver a significant increase in the pace of energy efficiency improvements in homes before 2025, including tightening minimum standards in private rented sector homes, to support delivery of the government's target for a 15 per cent reduction in energy demand by 2030

Remove clear barriers to deployment in the planning system by publishing National Policy Statements on energy to accelerate the consenting process for Nationally Significant Infrastructure Projects

Accelerate deployment of electric vehicle public charge points to reach the government's expectation of 300,000 by 2030 and keep pace with sales of electric vehicles

Ensure that Ofgem has a duty to promote the delivery of the 2050 net zero greenhouse gas emissions target

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Implement schedule 3 of the Flood and Water Management Act 2010 this year and without delay

Rapidly put in place plans to get on track to reduce per person water consumption to 110 litres per day by 2050, starting by finalising proposals on water efficiency labelling and water efficient buildings this year

Initiate a step change in recycling rates, including for food waste, by proceeding with the Consistency of Recycling Proposals, and finalising the Extended Producer Responsibility and Deposit Return Scheme

# Approach to reviewing progress

The government established the National Infrastructure Commission to assess the UK's long term infrastructure needs, provide impartial, expert advice on how to meet them, and hold the government to account for delivery. The Infrastructure Progress Review is the Commission's annual monitoring report and sets out the Commission's views on the extent to which the recommendations government has endorsed have been progressed and delivered over the past twelve months.

**The 2023 Infrastructure Progress Review reviews the government's progress over the past year against the recommendations from the 2018 National Infrastructure Assessment and the studies the Commission has published and which the government has responded to. The Commission uses five tests to assess progress in delivering endorsed recommendations. Each test is assessed to be either met, partially met, or not met. The judgements the Commission has made are supported by evidence, which is summarized in this document. The Infrastructure Progress Review is focused on assessing government progress against meeting those of its recommendations which government has endorsed, or where government has set out alternative proposals to the Commission's recommendations. It does not give an overall view on government's progress on infrastructure policy and delivery more widely.**

## The government's existing commitments

To date, the government has responded to the Commission's *National Infrastructure Assessment*, and eleven studies most recently the *Rail Needs Assessment*, *Engineered greenhouse gas removals*, and *Infrastructure, Towns and Regeneration*.

The Commission expects government to respond to its latest study *Reducing the risk of surface water flooding* in 2023. The Commission will make new recommendations to government in the upcoming second *National Infrastructure Assessment*, which will be published in 2023.

## The five tests

The Commission uses five tests, described below, to assess government's progress in delivering endorsed recommendations over the past year:

- **Taking a long term perspective:** government should look beyond the immediate spending review period and sets out its plans over the next ten to 30 years

- **Clear goals and plans to achieve them:** there should be a specific plan for government policy ambition or endorsed Commission recommendations that is commensurate with the task and contains clear deadlines and identified owners
- **A firm funding commitment:** where necessary policy ambition should be supported by firm funding commitments commensurate with the level of investment needed to deliver the required infrastructure
- **A genuine commitment to change:** the Commission has recommended that, in some areas, fundamental shifts in policy are required; government policy should respond in the same spirit
- **Delivery on the ground:** looking beyond policy, infrastructure should be changing in line with the Commission's recommendations, providing better services to consumers and taxpayers now.

The Commission ranks progress against the five tests into three categories: not met, partially met, and met:

- **Not met:** no or limited action has been taken by government to meet the test, and government is not on track to meet the test over the coming years. Substantial and sustained action is required to get on course to meet the Commission's recommendation.
- **Partially met:** material action has been taken that will bring about a real change, but not one that is fully commensurate with the test being met; to meet the Commission's recommendation more action will be needed.
- **Met:** current policy fully meets the test and a substantial part of the Commission's recommendation is on track to be delivered.

Ranking against the test reflect the Commission's judgements. The judgements are supported by a comprehensive analysis of the evidence, which is summarised in the rest of this report. For policy to be fully on track to implement the Commission's recommendation, each test should be ranked as met.

## Story of progress against the Commission's recommendations

The five tests against which the Commission assesses the Government's progress in each of the policy areas are as follows:

|                  |  |
|------------------|--|
| <b>Long term</b> | Look beyond the immediate spending review period and set out plans over the next ten to 30 years                                     |
| <b>Planning</b>  | Clear goals and plans to achieve them should be in place where government has endorsed a Commission recommendation                   |
| <b>Funding</b>   | A firm funding commitment should be in place commensurate with the level of investment needed to deliver the required infrastructure |
| <b>Change</b>    | A genuine commitment to change and deliver fundamental shifts in government policy   |
| <b>Delivery</b>  | Action on the ground with infrastructure changing in line with the Commission's recommendations                                      |

|                             | Long term  | Planning   | Funding    | Change     | Delivery   |
|-----------------------------|------------|------------|------------|------------|------------|
| Digital<br>Broadband        | Met        | Met        | Met        | Met        | Met        |
| Digital<br>Mobile           | Met        | Partly met | Partly met | Partly met | Partly met |
| Transport<br>Urban          | Partly met | Partly met | Partly met | Partly met | Partly met |
| Transport<br>Interurban     | Partly met | Partly met | Partly met | Partly met | Partly met |
| Transport<br>EVs            | Met        | Partly met | Met        | Met        | Not met    |
| Transport<br>Freight        | Met        | Partly met | N/A        | Partly met | N/A        |
| Energy<br>Electricity       | Met        | Partly met | Partly met | Partly met | Partly met |
| Energy<br>Heat              | Partly met | Not met    | Not met    | Not met    | Not met    |
| Energy<br>GGRs              | Met        | Not met    | Partly met | Met        | N/A        |
| Floods                      | Not met    | Not met    | Met        | Not met    | Partly met |
| Water                       | Met        | Partly met | Partly met | Partly met | Partly met |
| Waste                       | Met        | Partly met | Partly met | Partly met | Not met    |
| Cross cutting<br>Regulation | Not met    | Not met    | N/A        | Not met    | N/A        |
| Cross cutting<br>Resilience | Partly met | Not met    | Not met    | Partly met | N/A        |

# Digital

**Government continues to make good progress on supporting deployment of new digital infrastructure networks. Delivery of full fibre and gigabit capable broadband is progressing rapidly. And government has set out ambitious targets for 4G coverage in the Shared Rural Network agreement with industry. Across both fixed and mobile networks, government must ensure that hard to reach areas do not get left behind. In addition, Government must now set out a clear vision for 5G mobile networks in the upcoming Wireless Infrastructure Strategy.**

Government has made a genuine commitment to change digital connectivity across the country. Delivery of gigabit capable broadband networks is progressing rapidly and, in 2022, gigabit capable coverage was extended to over 70 per cent of premises. This reflects significant increased investment from operators in recent years. If operators deliver on their published plans, and government maintains the £5 billion subsidy programme for underserved areas, government will achieve its target to deliver nationwide coverage by 2030.

On mobile, 4G coverage from at least one operator now extends to around 92 per cent of the UK landmass, and the Shared Rural Network agreement should increase this to 95 per cent by the end of 2025, with further coverage improvements in the harder to reach areas continuing to be delivered until the start of 2027.

Mobile network operators are also extending their 5G network across the UK, and coverage outside of premises from at least one operator now stands at around 70 per cent. There has also been some improvement on coverage on the road network. However, challenges remain on upgrading mobile coverage on the rail network and securing investment for deploying new 5G networks.

Government must now set out a clear vision for 5G mobile networks in the upcoming Wireless Infrastructure Strategy. The long term commercial and strategic value of 5G will be determined by whether it becomes more than just a faster version of 4G, and whether it provides solutions to pressing problems.

## The digital sector

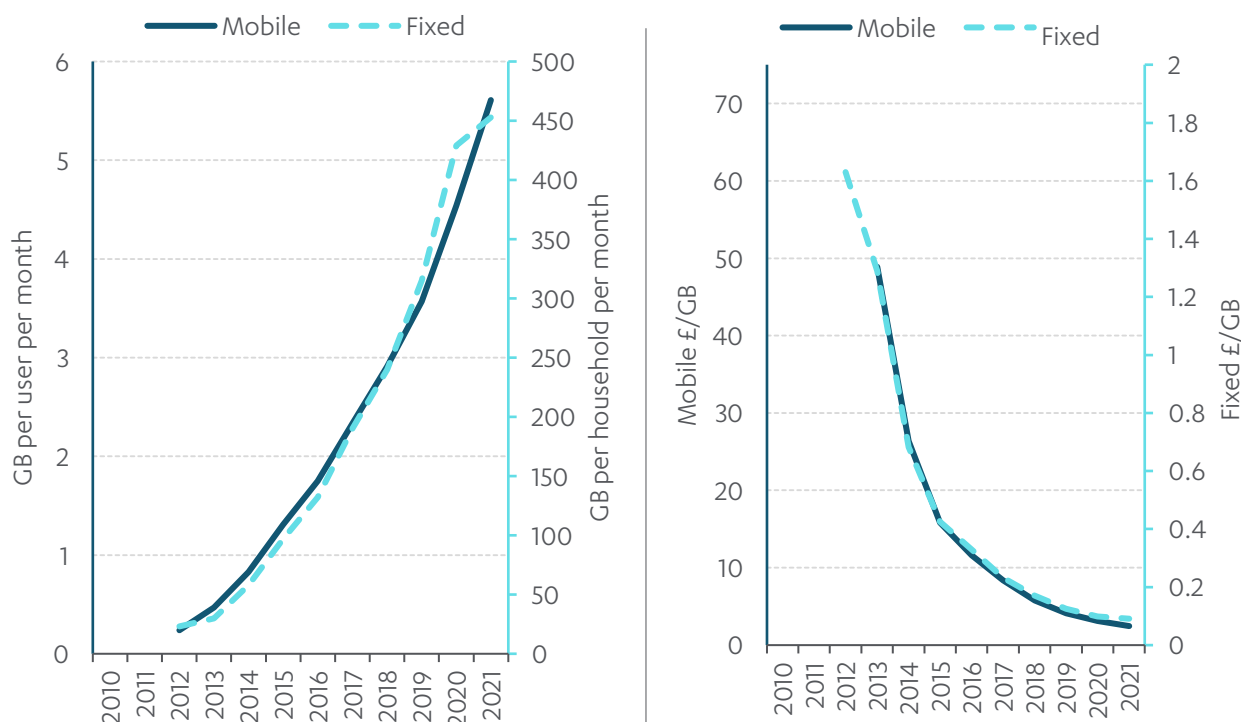
Digital infrastructure covered by the Commission focuses on services accessed by consumers and businesses in two categories: fixed broadband and mobile connections. The digital sector continues to perform well. Increases in consumption have been matched by reductions in unit prices (figure 4). This means consumers now pay less for both fixed and mobile services than they did a decade ago, although April will see above inflation price rises for many broadband and mobile services.<sup>23</sup> The UK's digital infrastructure has demonstrated good resilience.

However, in 2022, the number of outages or disruptions increased to 1,280, up from 760 the year before.<sup>24</sup> This was, in part, driven by winter storms causing outages on the power network.<sup>25</sup>

The Commission has set out a more detailed overview of the digital sector in the *Second National Infrastructure Assessment: Baseline Report Annex A: Digital* and the Commission's data on sector performance is available online.

## Figure 4: Consumption has grown rapidly over the past decade, but unit prices have fallen at the same time

*Data consumption and unit price of data, 2012 to 2021, United Kingdom*



Source: Ofcom - Communications Market Report (2022)

## Progress against the Commission's recommendations

### Commission recommendations

In 2018, the Commission recommended that government set out a nationwide full fibre connectivity plan by spring 2019, including proposals for connecting rural and remote communities, to ensure that full fibre connectivity would be available to 15 million homes and businesses by 2025, and to 25 million by 2030, with nationwide coverage by 2033. A significant number of premises will be commercially unviable for providers to deliver full fibre, so the Commission also recommended that rollout of full fibre to these premises should be partly subsidised by government.



To accelerate delivery, the Commission recommended that Ofcom should promote network competition through deregulation where possible, and by allowing access to Openreach infrastructure for alternative providers. The Commission also argued that government should improve processes to obtain wayleaves for telecommunications providers, promote the appointment of digital champions by local authorities, and work with Ofcom to allow for copper switch off by 2025.

In its *Infrastructure, Towns and Regeneration* study the Commission also highlighted that many commercially unviable properties will likely be in towns. Analysis suggests that around 20 per cent of towns may be reliant on government support to deliver gigabit capable broadband to more than 20 per cent of their premises.

## Government policy

Government has endorsed the Commission's recommendations on full fibre rollout in the Future Telecoms Infrastructure Review (2018) and its Response to the National Infrastructure Assessment.

In the National Infrastructure Strategy, the government set out its goal to deliver a minimum of 85 per cent gigabit capable coverage by 2025. In the Levelling Up White Paper government built on this target and set an aim to deliver gigabit capable coverage to at least 99 per cent of premises by 2030. Gigabit capable coverage refers to connections that can provide download speeds of 1 Gigabit or higher and can either be delivered through a full fibre connection or a hybrid fibre coaxial cable used by Virgin Media O2.<sup>26</sup> The Commission will continue to monitor government progress against its gigabit capable targets going forward.

In March 2021, the government announced Project Gigabit, a £5 billion fund to support the rollout of gigabit capable broadband to homes and premises in the hardest to reach 20 per cent of UK premises, equivalent to around six million premises. The 2020 Spending Review allocated £1.2 billion of this funding for the years between 2021 and 2025. The government has set out the first phases of its procurement programme to extend coverage to hard to reach premises.

Alongside Project Gigabit, both government and Ofcom have undertaken significant policy reform to ensure that the investment signals are right to support rapid deployment of gigabit capable networks. Ofcom published the Wholesale Fixed Telecoms Market Review 2021 – 26, which set out a series of decisions designed to support investment in gigabit capable networks, including policies to allow pricing flexibility and promote competition between networks, where viable.

The government has also continued to remove barriers to deploying new gigabit capable networks. The Product Security and Telecommunications Infrastructure Act received Royal Assent in December 2022. This made changes to the Electronic Communications Code to make it easier for operators to reach agreements to access private land to deploy telecoms infrastructure. It also strengthened the rights of operators to upgrade and share existing apparatus to deploy new networks.<sup>27</sup>

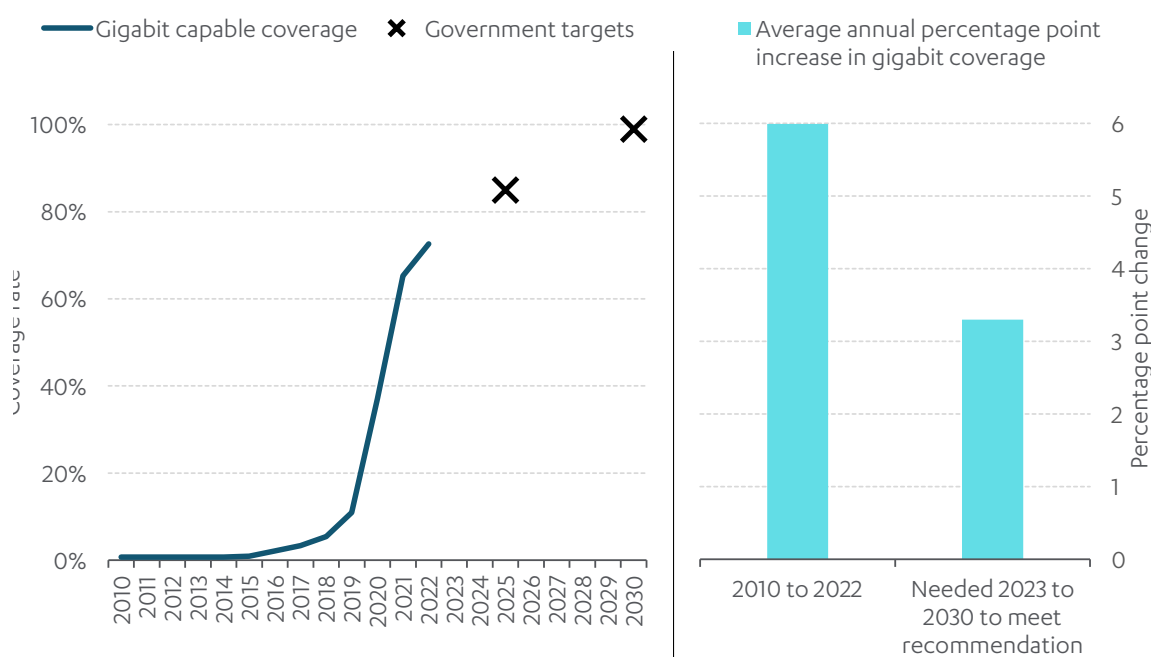
## Change in infrastructure

Progress on gigabit broadband coverage has continued over the past year. Gigabit capable coverage has increased from 65 to 73 per cent (figure 5). Much of the rapid increase in gigabit capable coverage over the past five years is due to Virgin Media upgrading its hybrid fibre network to be gigabit capable, which requires less effort than Openreach upgrading its copper network or new network build.<sup>28</sup> However, full fibre coverage has also increased rapidly in the last year from 30 per cent to 45 per cent, and so industry is still on track to meet government's targets.<sup>29</sup> However, rural coverage is lagging coverage in urban areas. As of 2022, over 73 per cent of urban premises in England have access to gigabit capable coverage, but only around 33 per cent of rural premises do.<sup>30</sup> This trend is similar in Scotland, Wales, and Northern Ireland.<sup>31</sup>

Industry has also made a series of positive commitments on gigabit capable rollout. Openreach has committed to spend £15 billion to deliver full fibre to 25 million premises across the UK by the end of 2026, including aiming to reach six million hard to reach homes and businesses across the country. As of November 2022, Openreach's full fibre coverage footprint stood at 8.7 million premises. In 2021 Virgin Media O2 announced that it would upgrade its entire fixed network to full fibre by 2028, and in July 2022 it announced a joint venture to pass seven million premises with a wholesale full fibre network.<sup>32</sup> Challenger firms are also expected to invest £17 billion in full fibre networks by 2025, and are expected to cover 11.5 million homes by the end of 2023.<sup>33</sup> The third largest network provider, CityFibre, announced in September 2022 that it had deployed full fibre to more than two million homes, 25 per cent of its overall coverage ambition of eight million premises.<sup>34</sup>

### Figure 5: Government is on track to deliver its gigabit capable targets

*Historic coverage and government targets 2010 – 2030 (Left chart), Rates of change in coverage 2010 - 2030 (Right chart), United Kingdom*



Source: thinkbroadband - UK Superfast and Fibre Coverage. **Note:** 'nationwide' gigabit coverage by 2030 is defined as at least 99 per cent of premises in Levelling Up White Paper

## Assessment of progress

If operators deliver against their published plans, the government is likely to deliver on its high level targets. But some challenges do remain for government in ensuring coverage is universal. Government is taking a long term approach, with funding and market frameworks in place to deliver clear plans, but it is essential that it accounts for how coverage will be extended to hard to reach premises going forward.

- **Taking a long term perspective: Met.** Government's goal for 85 per cent gigabit capable coverage by 2025 and 99 per cent coverage by 2030 looks beyond the current funding cycle and account for future proofing the network.
- **Clear goals and plans to achieve them: Met.** Government is taking the right procurement approach, focused on premises that lack superfast broadband. It is also positive that more premises are becoming commercial for private sector rollout.<sup>35</sup> But government must make sure there are no delays, and that rural premises are able to access gigabit capable connections at the same time as urban premises.
- **Firm funding commitment: Met.** The £5 billion funding for Project Gigabit aligns with the Commission's own estimates. But it is important that government allocates the remaining funding through future spending reviews, as needed. Market structures and regulation continue to incentivise significant private sector investment in the networks.
- **Genuine commitment to change: Met.** While government is making good progress, it must ensure that hard to reach premises are not left behind. Alongside spending money from Project Gigabit to support deployment in areas where the commercial case is weak, it must continue to develop approaches to overcome barriers to access that infrastructure providers face, for example through the recent reforms to the Electronic Communications Code.
- **Delivery on the ground: Met.** Good progress continues to be made in rolling out gigabit capable networks. Government appears on track to deliver its target of 85 per cent coverage by 2025 and 99 per cent coverage by 2030. Project Gigabit should be able to support connections to harder to reach premises. However, as Virgin Media O2 have upgraded their entire network to be gigabit capable, which resulted in a rapid increase in coverage between 2019 and 2021, coverage can now only be expanded through delivering new full fibre connections.

## Mobile connections

In *Connected Future*, the Commission recommended the expansion of 4G coverage to all UK roads and rail and that government must support rollout of 5G across the country.

To support this, in its study *Infrastructure, Towns and Regeneration*, the Commission recommended that:

- Ofcom should consider crowd sourced data based on real world usage to improve understanding of mobile coverage and produce insights that can help with further optimising mobile coverage

- government should partner with towns to run innovation pilots for new communications technologies, including 5G use cases.

## Government policy

In 2020, government secured the Shared Rural Network agreement with mobile network operators to increase 4G coverage across the country and reduce both total and partial not spots. To do this:

- 95 per cent of the UK landmass should have 4G coverage from at least one operator by the end of 2025, with further coverage improvements in the harder to reach areas continuing to be delivered until the start of 2027
- 84 per cent of the UK landmass will have 4G coverage from all four operators
- collectively operators will provide additional coverage to 16,000 kilometers of road and 280,000 premises.

The deal includes over £500 million of public investment, which is matched by over £500 million of private sector investment.

The government is currently developing a new Wireless Infrastructure Strategy, which will set out a strategic framework for the development, deployment, and adoption of 5G and future networks in the UK over the next decade.<sup>36</sup>

## Change in infrastructure over the past year

In 2022 UK 4G landmass coverage from at least one operator was 92 per cent, and 70 per cent for coverage from all operators (figure 6), compared to 92 per cent and 69 per cent respectively in 2021.<sup>37</sup> However, significant disparities between the nations persist (figure 6). This is largely driven by the difference in coverage in urban and rural areas: coverage from all operators is near 100 per cent in urban areas, but for rural areas it is around 67 per cent.<sup>38</sup>

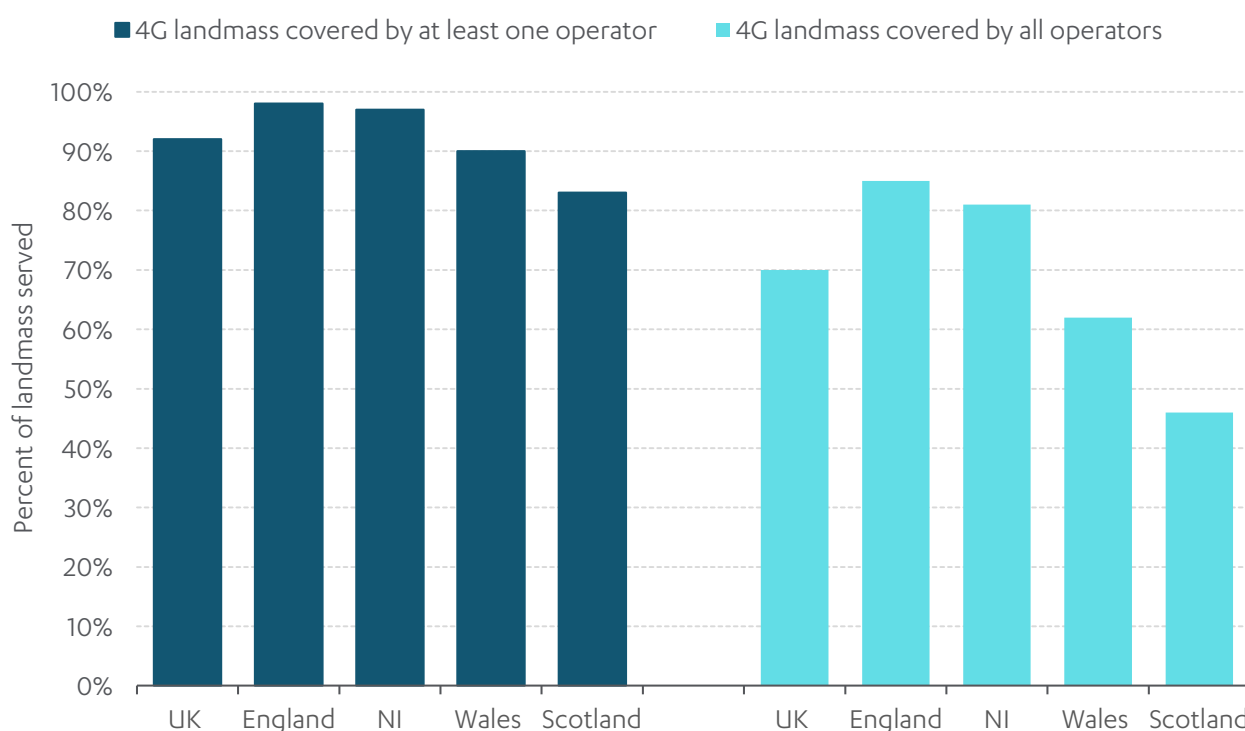
Coverage on the rail network remains poor and reporting on actual consumer experience of mobile coverage on railways is limited.<sup>39</sup> Ofcom published measurement data for mobile coverage along the rail network to the outside of train carriage in December 2019. It found that while predicted coverage may be present along the railways, this did not always mean that consumers had good coverage on trains, and that instead mobile coverage on the railways could be 'patchy and sometimes non-existent'.<sup>40</sup> Ofcom did not collect data on coverage inside train carriages and has not reported on mobile coverage along the rail network since 2019. However, Network Rail is entering into agreements with some network providers to upgrade its rail telecoms network and to improve coverage along rail routes.<sup>41</sup>

Coverage is not the same as consumer experience. Coverage statistics are based on predictions provided by mobile operators rather than user data. Consumer and business's experience of mobile coverage in certain areas may be very different to the reported numbers.

5G coverage continues to grow. Coverage outside premises from at least one operator has increased from around 50 per cent in 2021 to around 70 per cent in 2022.<sup>42</sup> There are now over 12,000 5G deployments in place in the UK, almost double the 6,500 reported in 2021.<sup>43</sup> 5G deployment has been focused on urban areas where deployments provide additional capacity for mobile broadband in areas of high demand, although availability in smaller towns and along busy transport routes has also been increasing.<sup>44</sup> However, to date 5G deployment has been non standalone,<sup>45</sup> with the first standalone networks only beginning deployment in 2023.<sup>46</sup> A standalone 5G network, where the 5G Radio Access Network is connected to a 5G core, can deliver the full functionality of 5G. In contrast, a non standalone network, where the 5G Radio Access Network is connected to a 4G core, is not able to support the full range of 5G capabilities including, for instance, ultra low latency.

### Figure 6: There is now good coverage of the UK landmass by at least one operator, but coverage by all operators is lower

*Percentage of 4G landmass covered by at least one operator and all operators, 2022, United Kingdom*



Source: Ofcom - Communications Market Report (2022)

## Assessment of progress

Government continues to make good progress on delivering nationwide mobile coverage. The Shared Rural Network agreement sets out a clear, long term plan for 4G mobile connectivity across the country. However, while there has been some improvement in road coverage, coverage on the rail network remains poor and must be improved. In addition, the UK still lacks a strategic approach to 5G deployment, and the upcoming Wireless Infrastructure Strategy must address this.

- **Taking a long term perspective: Met.** There is a long term strategy in place for 4G coverage and government recently released a strategy paper on 5G and 6G.
- **Clear goals and plans to achieve them: Partly met.** There are clear goals for 4G coverage and plans to deliver them through the Shared Rural Network agreement. However, there is currently no plan in place for delivering 5G. As part of the next National Infrastructure Assessment the Commission will consider what economic infrastructure sectors, such as energy or transport, may create 5G demand in future. Work must also continue establishing better reporting metrics for mobile coverage.
- **Firm funding commitment: Partly met.** There is clear funding in place for the Shared Rural Network agreement from government and the private sector. The investment case for 5G networks, whether for private or public funding, remains unclear due to the significant level of uncertainty around use cases for 5G.
- **Genuine commitment to change: Partly met.** On 4G coverage there is a clear commitment to change, and positive steps have been taken over the past year. However, this is not yet the case for 5G.
- **Delivery on the ground: Partly met.** There continues to be some increases in coverage from 4G networks, with additional sites being deployed to deliver the Shared Rural Network. Coverage on mainline rail networks remains poor, and more needs to be done to report on actual consumer experience of connectivity of trains. 5G networks are at an early stage of deployment, with no standalone networks operational yet.



# Transport

**Transport systems are important for connecting people to economic and social activities. However, constraints on transport infrastructure continue to hold back large cities and towns, preventing them from achieving their productivity potential and hindering quality of life. At the same time, transport remains far too carbon intensive. Progress implementing the Commission's recommendations, from broadening devolution to decarbonising road transport, has been too slow.**

Government has made some progress with devolution, taking forward the commitments from the Levelling Up White Paper to transfer new powers, funding, and responsibilities to City Regions. The trailblazer deals and single multi year budgets announced for Greater Manchester and West Midland Combined Authorities are exemplars. However, devolution must stretch across the whole country not just to major city regions. Progress empowering local authorities and helping them build capacity and capability must continue.

Progress on key transport projects connecting major cities is mixed. The Integrated Rail Plan is a long term plan for rail in the North and Midlands to build new high speed lines and upgrade and electrify existing lines. While government's commitment to East West Rail in the Autumn Budget is welcome, further action on the Cambridge-Milton-Keynes-Oxford arc remains slow. Greater urgency on delivery is needed or the country will miss a significant growth opportunity.

In 2022, government published critical strategies on decarbonising road transport, which reinforce government's aim to reach near 100 per cent electric car and van sales by 2030. There are, however, only eight years left to achieve this target. A rapid increase in electric vehicle charge point deployment is needed now to achieve this ambition.

### **Actions for 2023:**

- Move away from competitive bidding processes to give local areas more flexibility and accountability over economic growth funds, and implement flexible, long term devolved budgets for all local transport authorities
- Demonstrate staying power by progressing the Integrated Rail Plan for High Speed 2 and Northern Powerhouse Rail and remaining committed to the £96 billion investment required
- Follow through on commitments made in 2018 to the Cambridge-Milton Keynes-Oxford growth arc, by setting out how the road and rail infrastructure to support new houses and businesses will be delivered
- Accelerate deployment of electric vehicle public charge points to reach the government's expectation of 300,000 by 2030 and keep pace with sales of electric vehicles.

## **The transport sector**

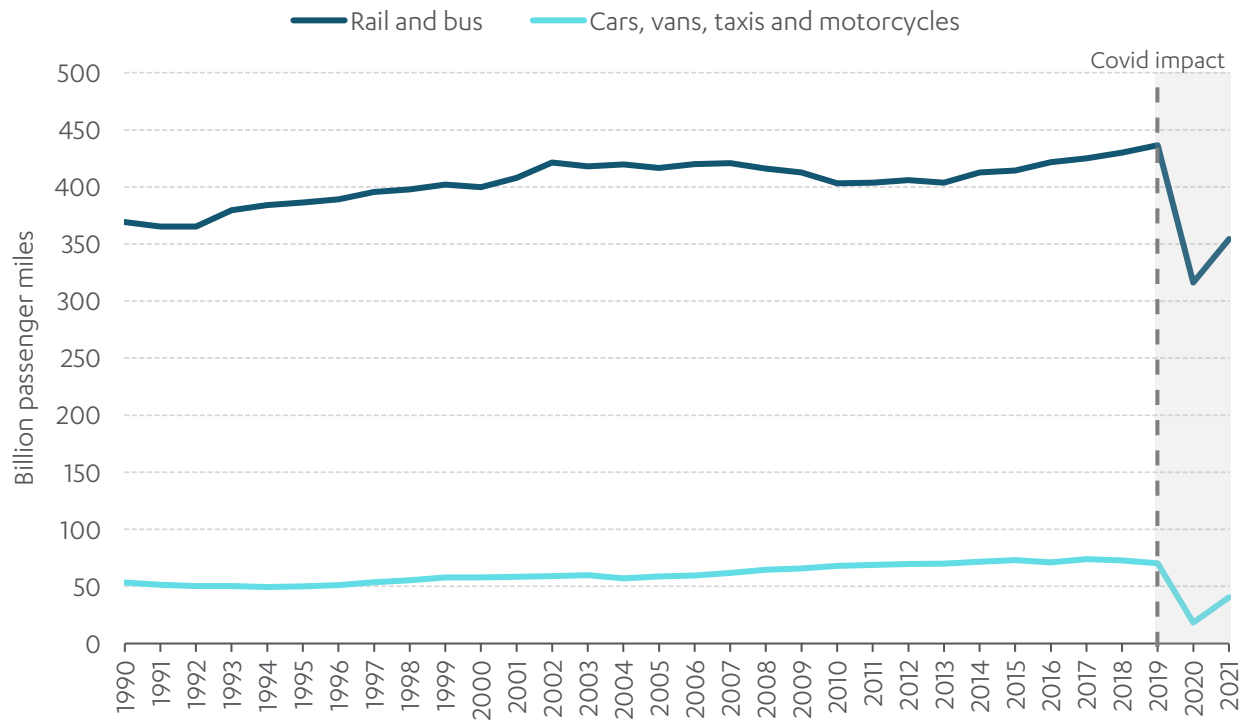
Transport infrastructure connects people, communities, and businesses, and is essential to economic growth, productivity, and quality of life. It includes the roads and rail used by transport, stations used by passengers to access the network, fueling infrastructure such as electric vehicle charging points, and ports and airports.

Improving transport connectivity is the most significant way that infrastructure can contribute to improving productivity across the country's regions. Cities must be well connected to each other so that they can trade in goods and services, and freight distribution networks need to operate efficiently. Urban areas need to be able to expand beyond the limits that congestion places on road capacity, requiring mode shift from cars to other forms of travel. And this needs to be done while improving the environment, particularly reducing carbon emissions to meet carbon budget and net zero targets.

The 30 years before the Covid 19 pandemic saw overall transport passenger miles and freight mileage gradually increasing. Modes of transport have followed different patterns, but the overall trend has been a steady long term increase, driven primarily by a rise in journeys by private car. The pandemic changed travel behavior dramatically. Total volume of travel has now reached close to prepandemic levels.<sup>47</sup> The extent to which transport patterns will revert to previous trends, or whether changes in behaviour will become permanent, remains unclear but will be critical for future policy. Network capacity is driven by peak demand, whereas the ability to pay for transport systems is dependent on total revenues. A challenging situation could emerge where peak loading returns to pre pandemic levels, even if on fewer days of the week, but overall passenger numbers and revenue per passenger remain down. This would result in revenues struggling to cover the largely fixed costs of the networks.

**Figure 7: Transport usage has risen over the past 30 years**

*Annual passenger miles for surface transport, 1990 - 2021, Great Britain*

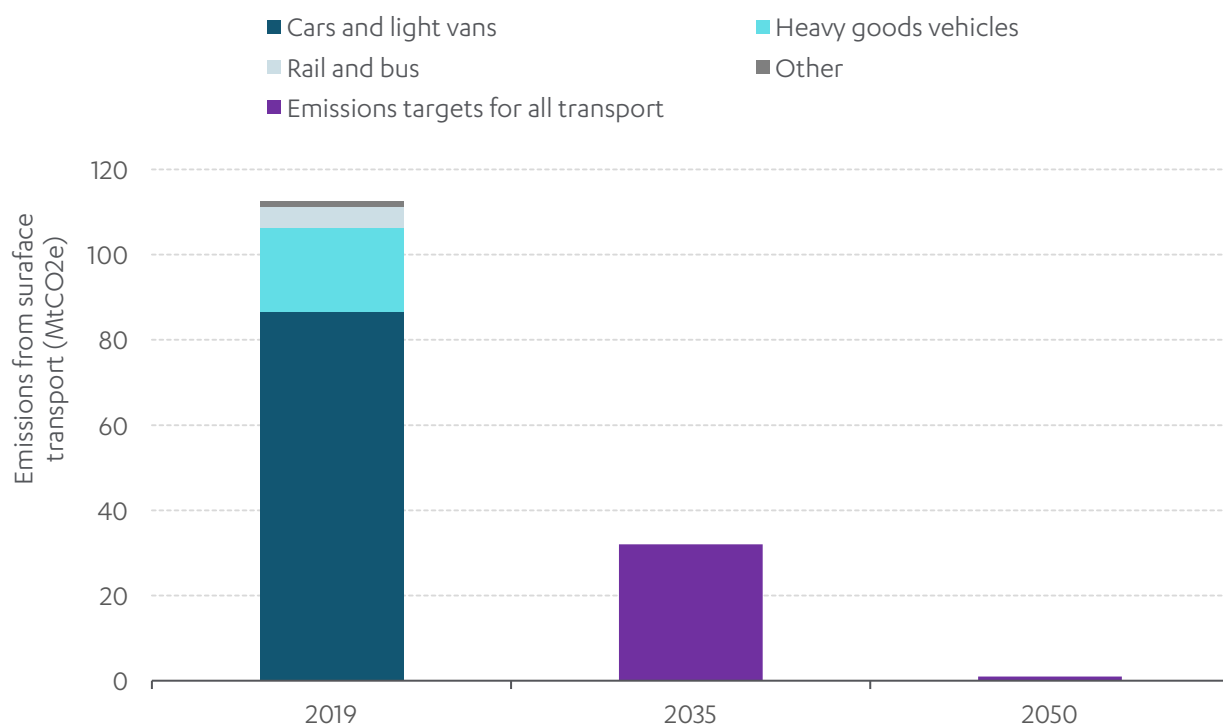


Source: Department for Transport - modal comparisons (2022)

Despite the impacts of the pandemic, transport remains the biggest contributor of greenhouse gases by sector, producing 101 MtCO<sub>2</sub>e in 2021, around 25 per cent of the UK's total emissions.<sup>48</sup> Emissions from cars and vans accounted for around 75 per cent of the UK's total domestic transport greenhouse gas emissions in 2019. Emissions from heavy goods vehicles accounted for around 15 per cent.<sup>49</sup> Therefore, moving past fossil fuels towards a zero emissions fleet of vehicles is central to reaching net zero.<sup>50</sup>

## Figure 8: Cars and heavy goods vehicles make up the vast majority of surface transport emissions

*Historic transport emissions and target for 2035 and 2050, United Kingdom*



Source: Department for Transport - Energy and environment (2022), Climate Change Committee Sixth Carbon Budget (2020)

**Note:** Figure uses 2019 emissions rather than 2020 emissions due to uncertainty around the short term impact the pandemic may have had on emissions.

The Commission has set out a more detailed overview of the transport sector in the *Second National Infrastructure Assessment: Baseline Report Annex: F Transport* and the Commission's data on the performance of the sector is available online.

## Progress against the Commission's recommendations

### Urban and local transport

#### Commission recommendations

The first *National Infrastructure Assessment* recommended that local leaders in city regions outside London be given stable, devolved five year infrastructure budgets.<sup>51</sup> The Commission's study *Towns, Infrastructure and Regeneration* built on this recommendation, calling for government to provide all county and unitary authorities, or combined authorities where they are in place, with devolved five year budgets for transport and make available expert strategic advice and support for places that lack the capability and capacity to develop their own infrastructure strategies and wider place based plans.<sup>52</sup>

These recommendations set out how local transport funding should be reformed to enable infrastructure strategies to be developed and led locally, by people who understand the needs and strengths of the area and can take account of the local context. The study highlighted that a permanent transition away from the competitive bidding system that erodes local capacity is needed.

The first Assessment also recommended that government commit long term funding for major urban transport investment. This includes locally raised finance and a process to identify priority cities for transformational upgrade programmes, to be developed in partnership with local authorities.<sup>53</sup>

## Government policy

The Levelling Up White Paper extended devolution beyond metropolitan areas and committed to inviting nine areas to agree new County Deals, with all areas of the country having a chance to agree a deal by 2030. Subsequently, the Spending Review 2021, through the City Region Sustainable Transport Settlements, committed to £5.7 billion for England's largest Mayoral City Combined Authorities for 2022-27, to transform local transport networks through London style integrated settlements. It also committed £5.3 billion funding for local road improvements and maintenance.<sup>54</sup> At the Spring Budget 2023 government followed up on this with a further £8.8 billion transport funding for England's largest Mayoral City Combined Authorities through the City Region Sustainable Transport Settlements from 2027-28 to 2031-32.<sup>55</sup>

The Levelling Up and Regeneration Bill was introduced into Parliament in May 2022 and expands on devolution by enabling the creation of Combined County Authorities through new devolution deals.<sup>56</sup> In 2022, devolution deals were signed for York and North Yorkshire, the East Midlands, Cornwall, Norfolk, Suffolk and the North East.<sup>57</sup> At Spring Budget 2023 government promised deeper devolution deals ('trailblazer deals') for Greater Manchester and West Midlands Combined Authorities that will give a single multi year funding settlement across local growth policy areas including transport.<sup>58</sup>

The government issued its response to the Commission's study Towns, Infrastructure and Regeneration in August 2022. The response recognises the importance of devolution and repeats the commitments from the Levelling Up White Paper to extend the number of areas with devolved powers but indicates that beyond the five year settlements already provided through City Region Sustainable Transport Settlements, more bespoke arrangements will be a matter of negotiation in each devolution deal. The response highlights the advisory service the UK Infrastructure Bank is developing to support local authorities to develop infrastructure projects that support net zero or regional and local growth.<sup>59</sup>

The government has only committed to one large scale urban transport project, announcing as part of the Integrated Rail Plan that it will support West Yorkshire Combined Authority as it plans and builds a mass transit system, at an indicative cost of over £2 billion.<sup>60</sup> A statutory consultation has been launched to review the revised West Yorkshire Mass Transit Vision 2040, which sets out the process for developing a new system of transport to make the region greener, more inclusive, and better connected.<sup>61</sup>

## Assessment of progress

Progress with devolution deals in major city regions is welcome, particularly for the Greater Manchester and West Midlands Combined Authorities. However, progress extending devolution beyond these areas is slower. Government's timeline to finalise devolution deals by 2030 is unambitious and they can and should be delivered much faster. To empower local leaders to deliver regional growth, government must invest sufficient time and resources to deliver new structures:

- **Long term: Partly met.** The five yearly transport budgets given to England's largest Mayoral City Combined Authorities will enable them to plan ahead. The recent commitment from government of £8.8 billion for the next five years now gives funding certainty for maintenance and enhancements for the next ten years, a significant step forward. A legislative framework to enable the cycle of five year city region budgets to be renewed permanently would also help facilitate long term planning. And longer term transformational goals will not be achieved without commitment to planning projects on a larger scale for key cities. Other transport authorities now need to be given the same planning horizon.
- **Clear goals and concrete plans to achieve them: Partly met.** While positive progress has been made for City Regions, the government's ambition to establish simplified funding arrangements for places outside cities should be achievable much sooner than 2030. It already has a clear working model for devolved transport budgets, tested in existing Mayoral Combined Authorities through the current City Region Sustainable Transport Settlements, which could be extended.
- **Firm funding commitment: Partly met.** Funding for England's largest Mayoral City Combined Authorities is now confirmed for the next five year period (out to 2032). But other places are still waiting to see what scale of investment they should be planning for. The funding made available so far has been sufficient for incremental improvements, but not to enable transformational change.
- **Genuine commitment to change: Partly met.** There has been some progress with extending devolution, with half the country's population living in an area with a combined authority or devolution deal in place.<sup>62</sup> Additionally, the 'trailblazer' deals and single multi year settlements for the Greater Manchester and West Midlands Combined Authorities are a step towards providing local partners with more flexibility and accountability over funding. However there needs to be a permanent shift away from competitive bidding between councils for multiple, centrally controlled, short term funding pots. Government accepted the Commission's recommendation to make expert strategic advice and support available to authorities representing towns, and must continue taking steps to empower local authorities and help them build capacity and capability.
- **Delivery on the ground: Partly met.** Beyond the West Yorkshire mass transit system, government has not made further plans for major urban transport schemes.



# Interurban transport

## Commission recommendations

In the *Rail Needs Assessment*, the Commission set out a menu of rail investment options in the Midlands and the North, including the latter stages of High Speed 2. The *Rail Needs Assessment* set out five different illustrative packages of rail schemes that could be taken forward, depending on the level of funding made available by government:

- focusing on upgrades with a baseline budget of £86 billion; consistent with rail spending in the North and Midlands proposed in the Commission's first National Infrastructure Assessment
- prioritising regional links with both a 25 per cent increase (£108 billion) and 50 per cent increase (£129 billion) funding scenario
- prioritising long distance links, again with both a 25 per cent increase (£108 billion) and 50 per cent increase (£129 billion) funding scenario.

The *Rail Needs Assessment* concluded that focusing on upgrades alone would not meet the strategic objective of levelling up, and that prioritising regional links would likely bring higher economic benefits overall for cities in the North and Midlands than the long distance link packages. The Commission recommended that government should take an adaptive approach to investment and commit to a core set of affordable, stable investments, with a clear funding profile and rigorous costings.

The Commission has also made recommendations on infrastructure to support the Cambridge-Milton Keynes-Oxford arc. The region contains some of the most productive and innovative places in the country, centered around two of the world's leading universities. There are over two million jobs in the region adding over £110 billion to the economy every year.<sup>63</sup> The region is an internationally competitive cluster, with a highly skilled labour force, world leading research facilities, and knowledge intensive firms. The central finding from the Commission's study Partnering for Prosperity was that rates of house building will need to double if the region is to reach its economic potential, and that this should be delivered through new housing settlements. These housing settlements are being held back by a lack of infrastructure. The Commission recommended that government progress work on East West Rail between Oxford and Cambridge and the Oxford-Cambridge expressway road.

## Government policy

The Government set out a long term plan for rail in the North and Midlands through the Integrated Rail Plan in 2021, which includes a commitment of £96 billion government investment over the period to 2050. The Integrated Rail Plan committed to:

- the completion of High Speed 2 from Crewe to Manchester
- A new line from the West Midlands to East Midlands Parkway
- a combination of upgrades and new line to connect Liverpool, Manchester and Leeds.

The Integrated Rail Plan also committed to electrifying and/or upgrading three existing main lines, including the Transpennine Route, and set out government's plans to improve local services and integrate these properly with High Speed 2 and Northern Powerhouse Rail. The adaptive approach recommended by the Commission in the Rail Needs Assessment was taken forward, with a core pipeline of investment and options to potentially roll out further schemes.<sup>64</sup> In January 2022, government introduced the High Speed Rail (Crewe – Manchester) Bill to seek the powers needed to construct and operate High Speed 2 between Crewe and Manchester, with an Additional Provision introduced six months later. A further £959 million of funding was made available for the Transpennine route upgrade in July 2022. The government recommitted to core Northern Powerhouse Rail, High Speed 2 to Manchester and East West Rail in the Autumn Statement 2022. In the Spring Budget 2023 government also confirmed that it will make a route announcement for East West Rail in May, along with committing £15 million for local authorities to maximise economic opportunities along the route.

With the annual rate of construction output price growth at 9.7 per cent in 2022, construction inflation is placing pressure on capital budgets.<sup>65</sup> The most recent report to Parliament on High Speed 2 indicated that the first phase of High Speed 2 is projected to exceed its target budget.<sup>66</sup> The Department for Transport has recently announced that, due to inflationary and affordability pressures, construction on phase 2a between Birmingham and Crewe will be rephased by two years and Euston station will also not be completed until later in the programme.<sup>67</sup>

In the Cambridge-Milton Keynes-Oxford Arc, government remains committed to the East West rail link. However, plans for the Oxford Cambridge Expressway have been cancelled. Government argued that, despite initial commitments, it was no longer possible to deliver the scheme and its benefits at a reasonable cost.<sup>68</sup> To support the region government began creating a spatial framework to help develop a strategic vision for the Cambridge-Milton Keynes-Oxford arc and facilitate the successful deployment of the East West rail link. A draft spatial framework for consultation was due to be published in autumn 2022, with implementation of the final framework shortly after.

## Change in infrastructure over the past year

The first phase of High Speed 2 is under construction, with work underway at over 350 active sites. This phase is due for completion in stages between 2029 and 2033, depending on further approval for later stages.<sup>69</sup>

The East West Rail project will be delivered in three connection stages: Oxford to Bletchley and Milton Keynes, Oxford to Bedford and Oxford to Cambridge. As part of connection stage one, the upgrade of the rail connection between Oxford and Bicester was completed in December 2016. Further work on connection stage one is underway on the line that links Bicester to Bletchley and Milton Keynes. This includes reconstructing and repairing existing sections of the line and sections that are no longer in use. Services between Oxford and Milton Keynes via Bletchley are expected to commence in 2025.<sup>70 71</sup>

## Assessment of progress

The Integrated Rail Plan sets out government's plan to deliver major long term investments to improve rail for the North and Midlands in the face of public spending constraints. However, progress is less positive on the Cambridge-Milton Keynes-Oxford Arc. Although some progress has been made on East West rail, the Oxford-Cambridge Expressway has been cancelled and there has been no further progress on publishing the spatial framework. The region presents a significant growth opportunity for the UK but this will be missed if long term certainty is not provided.

- **Long term: Partly met.** The Integrated Rail Plan considers the next 30 years, providing a long term plan for rail in the North and Midlands to build new high speed lines, stations, and upgrade and electrify existing lines. However, the long term vision for the Arc is less clear.
- **Clear goals and concrete plans to achieve them: Partly met.** The Integrated Rail Plan is a realistic plan, that takes an adaptive approach and includes a set of strategic objectives and a timeline for when they should be achieved. Government must continue to provide certainty that the commitment in the Plan will be delivered. There has been wavering commitment to the Arc in the last year. Government should clarify their vision for the direction of the Cambridge-Milton Keynes-Oxford region, including the expected roles of different stakeholders and the intention for the spatial framework.
- **Firm funding commitment: Partly met.** Significant funding has been allocated through the Integrated Rail Plan for High Speed 2 and to part of the East West Rail route. The full route for all stages of East West Rail should be announced as soon as possible and long term funding should be forthcoming to enable construction of the remaining parts of the line to start in mid 2020s.
- **Genuine commitment to change: Partly met.** The Integrated Rail Plan sets out the ambition to significantly improve connectivity into and between major population centres in the North and Midlands. It is the largest public investment in Britain's rail network. Additionally, it takes an adaptive approach, setting out a core pipeline of investment that should speed up delivery of benefits for communities and businesses. Government should continue to take an adaptive approach to ensure that the project does not overrun in terms of costs and delivery dates.
- **Delivery on the ground: Partly met.** Some progress is being made on the projects committed in the Integrated Rail Plan and to construct East West Rail. However, the Oxford Cambridge Expressway has been cancelled. Delays to delivery of High Speed 2 will inevitably delay the benefits of greater connectivity that are crucial to the economies of towns and cities across the North and Midlands – government must act to create a greater sense of certainty around the whole project and ensure that there are no delays to the current timetable for High Speed 2 services reaching Manchester.

# Deploying electric vehicles

## Commission recommendations

Emissions from cars and vans accounted for around 75 per cent of the UK's total domestic transport greenhouse gas emissions in 2019. The transition of the fleet to electric vehicles will be one of the most important actions to decarbonise the transport sector. In the National Infrastructure Assessment, the Commission recommended that government, Ofgem and local authorities should enable the rollout of charging infrastructure sufficient to allow consumer demand to reach close to 100 per cent electric new car and van sales by 2030. To facilitate this a national network of both rapid and slower chargers will be needed. To support this the Commission recommended that:

- government should subsidise rapid charge points in rural or sparsely populated areas of the country where the market alone is unlikely to deliver; a visible core network of rapid chargers is critical to give drivers confidence and tackle range anxiety
- Ofgem ensure that charge points can contribute to the optimisation of the energy system and work with network operators and charge point providers to identify areas where anticipatory investment in the networks may be needed.

The Commission's study *Infrastructure, Towns and Regeneration* highlighted the challenge of providing on street charge points in towns and cities. The Commission recommended that government should publish an electric vehicle charging infrastructure strategy and roadmap for the rollout of electric vehicle charging infrastructure in towns. Local infrastructure strategies should also include an active role for the local authority in planning and managing the rollout of on street electric vehicle charging.

## Government policy

In the 10 Point Plan for a Green Industrial Revolution, the government committed to end the sale of new petrol and diesel cars from 2030.<sup>72</sup> To support this goal, government published the UK Electric Vehicle Infrastructure Strategy in March 2022. The strategy sets out a vision and action plan for the rollout of electric vehicle charging infrastructure in the UK. The Strategy highlights that there are several barriers to deployment, such as difficulty of the commercial model for on street residential chargers, the cost and time needed to connect new charge points to the electricity system and the lack of local engagement and leadership for charge point roll out.

As part of the plan government set out that it expected around 300,000 public charge points as a minimum by 2030.<sup>73</sup> Government has published a local authority toolkit for installing electric vehicle charging infrastructure to empower them to facilitate the rollout of high quality charging infrastructure to meet residents' needs.<sup>74</sup> Government has already announced a range of funding streams, including:

- a £500 million infrastructure package for local authorities to expand the provision of local public charge points

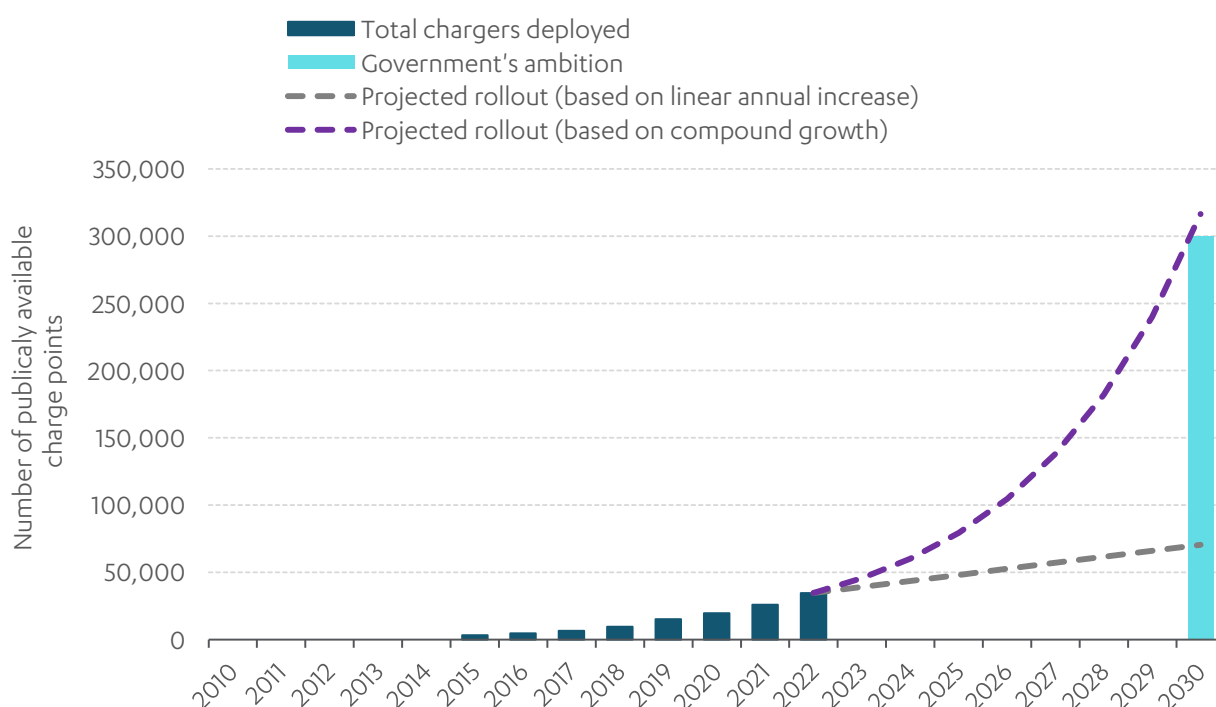
- £10 million for a pilot of the local electric vehicle infrastructure fund to help local authorities scale up their local charging provision
- £950 million rapid charging fund to accelerate the rollout of high powered chargers on the strategic road network
- Ofgem announced £300 million for additional network investment in May 2021, half of which will target the development of electric vehicle infrastructure, including rapid charge points to reduce range anxiety and improve consumer confidence<sup>75</sup>
- £56 million of public and industry funding for increasing charge points across the country<sup>76</sup>
- Government published the Electric Vehicle Smart Charging Action Plan in January 2023, which outlines the next steps that government and Ofgem will take to deliver energy flexibility from electric vehicle charging, providing affordable, green power.<sup>77</sup>

## Change in infrastructure over the past year

The deployment of charge points has been increasing in recent years. As of January 2023, there were 37,055 public electric vehicle charging devices installed in the UK, of which 6,887 are rapid charge points. However, the rate at which these are installed will need to accelerate to meet the Government's expectation of at least 300,000 by 2030 (figure 9, next page).<sup>78</sup> If charge point deployment grows at around 30 per cent per year, as it has done in recent years, government's 300,000 expectation will be met (purple line in figure 9). But this would represent a significant increase in the number of charge points being deployed. Falling costs could facilitate this, and charge point deployment has followed this trajectory in other countries such as Norway. However, if barriers to deployment remain, such as challenging commercial models for on street charging or lack of local leadership, this is unlikely to happen. If charge point deployment increases linearly by the same number as in recent years (grey line in figure 9, page 38), deployment will fall well short of the 300,000 expectation.

**Figure 9: A rapid increase in charger deployment will be needed to meet the government's goal**

*Publicly available electric vehicle charge point roll out, 2015 - 2030, United Kingdom*



Source: Department for Transport - Electric vehicle charging device statistics (October 2022)

**Note:** Linear growth based on historic average annual increase in total deployment projected forward to 2030. Compound growth based on average annual percentage growth in deployment between 2020 and 2022, projected forward to 2030

## Assessment of progress

Government has demonstrated positive ambition in deploying electric vehicle charging infrastructure. However, if deployment of charge points does not now accelerate rapidly, there is a significant risk that government's target for ending the sale of petrol and diesel cars and vans by 2030 will be missed. The Electric Vehicle Infrastructure Strategy sets out a market led approach to delivering charging infrastructure.

- **Long term: Met.** Government's commitment to end the sale of new petrol and diesel cars by 2030 shows it is thinking beyond the next few years.
- **Clear goals and concrete plans to achieve them:** Partly met. The Electric Vehicle Smart Charging Action Plan provides a detailed roadmap with the key milestones to deliver the actions in the plan. The Electric Vehicle Infrastructure Strategy identifies key challenges to the electric vehicle transition and sets out government's approach to addressing them, including setting an expectation of a minimum of 300,000 public charge points by 2030. The commitment is a step in the right direction. However, detail on how charge point deployment will be accelerated is lacking.

- **Firm funding commitment: Met.** Government commitments in recent Spending Reviews showed a clear funding commitment to support the uptake of electric vehicles and deployment of charging infrastructure. Ofgem's £300 million investment is a good step to deliver anticipatory investment in the network, as recommended by the Commission.
- **Genuine commitment to change: Met.** By setting a 2030 deadline for the end of new sales of fossil fuelled cars and vans, government has demonstrated a clear willingness to fundamentally change road transport in the UK.
- **Delivery on the ground: Not met.** The delivery of charge points from the market has increased significantly in recent years. However, deployment must now accelerate rapidly if 300,000 public charge points are to be deployed by 2030 (figure 9).

## Freight

### Commission recommendations

The decarbonisation of road freight poses a significant challenge and accounts for around 15 per cent of surface transport emissions (figure 8, page 30). Heavy goods vehicles require greater power than cars due to their weight and are therefore more carbon intensive. Additionally, the long distances they often travel make recurrent recharging impractical. Due to these complexities, there isn't a single solution for zero emission heavy goods vehicles. Currently, battery electric and hydrogen are emerging as the most viable potential alternatives to diesel. Government must ensure the sector is prepared for the likely infrastructure requirements of both hydrogen and battery electric heavy goods vehicles.<sup>79</sup>

In the study *Better Delivery: the challenge for freight*, the Commission recommended that:

- government commit to decarbonising road freight by 2050, develop a strategy for this and announce plans by the end of 2021 to ban the sale of new diesel powered heavy goods vehicles no later than 2040
- government prepare detailed assessments of infrastructure required to support uptake of battery electric or hydrogen HGVs
- government establish a new freight council comprised of representatives across all modes to inform government's thinking on the future of freight
- government produce new planning practice guidance on freight for strategic policy making authorities.

### Government policy

In July 2021, government published the Transport Decarbonisation Plan. This sets out how government will reduce emissions from the transport sector to meet the net zero target.<sup>80</sup> Government subsequently published its long term plan for the freight sector, Future of Freight, in June 2022. This sets out government's plan to deliver, alongside industry, their vision for the sector: a freight and logistics sector that is cost efficient, reliable, resilient, environmentally



sustainable and valued by society. It includes a commitment to work with industry stakeholders to develop a plan for zero emission HGV infrastructure rollout. The Future of Freight was co developed with the Freight Council, which government established in 2021.<sup>81</sup>

## Assessment of progress

The Transport Decarbonisation Plan makes clear commitments to decarbonise the sector in line with the Commission's recommendations. Future of Freight presents government's long term plan for the freight sector.

- **Long term: Met.** The Transport Decarbonisation Plan sets out many long term targets for the sector, including the commitment to end the sale of non zero emission heavy goods vehicles by 2040. Future of Freight establishes government's commitment to a long term, cross government and cross modal approach to delivering the vision for the sector.
- **Clear goals and concrete plans to achieve them: Partly met.** The Freight Council delivered its initial milestone, to co develop Future of Freight and its focus has now shifted to the implementation of the plan. The plan identifies several specific priority areas which they will take forward. However, Future of Freight lacks detail about securing further investment that might be needed, particularly for rail freight, to reach zero emissions by 2050. The government also needs to proceed quickly with its industry plan for HGV refueling infrastructure.
- **Firm funding commitment: Not applicable.** The Commission has not made specific recommendations on funding needed to decarbonise freight. However, the Commission recognises the recent funding commitments made by government to support the sector's transition to Net Zero, including £200 million of funding to boost the rollout of zero emission vehicles and £7 million to boost the uptake of innovative new technologies.<sup>82</sup>
- **Genuine commitment to change: Partly met.** The establishment of the Freight Council shows commitment to a cross modal approach to freight and Future of Freight sets out government's continued commitment to delivering a net zero emissions freight sector. Government committed to undertaking a regulatory review of barriers to implementing new energy infrastructure for freight to feed into Ofgem's next distribution price review, as recommended by the Commission. It will be important for this to address how grid capacity for van charging at depots can be unlocked at pace. Additionally, the plan committed to consulting on changes to the planning system, planning guidance, and local transport plan guidance. This should be acted upon without delay.
- **Delivery on the ground: Not applicable.** Given the timeline set out in the Commission recommendations and the Future of Freight plan, action on the ground is not yet expected.

# Energy

**The UK is too reliant on natural gas; a high cost, high carbon, and insecure source of energy. In 2022, the sharp rise in gas prices prompted by Russia's invasion of Ukraine increased the cost of energy and jeopardised security of supply. At the same time, relying on natural gas for electricity and heating leaves the energy system far too carbon intensive.**

Concrete action is required to reduce the use of gas and oil (which is mainly used in the transport sector and is covered in the transport chapter of this report). Without this, the country will retain its high cost, high carbon, and insecure energy system in the coming decades.

Natural gas represents too much of the country's energy consumption and is far too carbon intensive. Around 40 per cent of electricity generation is powered by natural gas,<sup>83</sup> and 88 per cent of homes are heated with gas boilers.<sup>84</sup> Gas is responsible for around 77 per cent of emissions from electricity generation, and around 86 per cent of emissions from homes.<sup>85</sup> The successful transition away from coal use means that use of natural gas is the main obstacle to delivering a net zero electricity sector, as well as using electrification to decarbonise heat and transport.

The supply and price of natural gas is vulnerable to international shocks. Net imports make up 57 per cent of the UK's gas supply.<sup>86</sup> The shock to international gas supplies caused gas prices for households to rise by 84 per cent in the year to June 2022,<sup>87</sup> and caused electricity prices to rise by 45 per cent over the same period.<sup>88</sup>

Deploying low carbon alternatives and reducing wasted energy is the best way to transition away from gas. This will cut costs, improve energy security, and decarbonise the economy.

Deployment of renewable electricity over the next decade will reduce reliance on gas in the power system and cut emissions. The cost of renewable electricity, through offshore wind, onshore wind and solar, is lower and less volatile than producing electricity with natural gas. This will remain the case even when prices fall from their current extreme levels. The government needs to maintain the strong pace of renewable deployment and bring forward firm plans to deliver the flexibility that a decarbonised system will need.

The planning system will need to move more quickly to enable sufficient deployment of renewable generation. Decarbonising the electricity system will require over 17 transmission projects to receive development consents in the next four years, a fivefold increase on current rates.<sup>89</sup> Government should publish updated National Policy Statements for energy, and increase capacity across the planning system.

**Improving the energy efficiency of homes will also reduce the use of natural gas for heating and is one of the best ways to durably lower bills for households. In the longer term, every gas boiler will also need to be replaced with a low carbon alternative, such as a heat pump. The government must urgently step up the level of ambition on energy efficiency and increase the pace of the transition to low carbon heat.**

### **Actions for 2023**

- Deliver a significant increase in the pace of energy efficiency improvements in homes before 2025, including tightening minimum standards in private rented sector homes, to support delivery of the government's target for a 15 per cent reduction in energy demand by 2030
- Publish National Policy Statements on energy to accelerate the consenting process for Nationally Significant Infrastructure Projects.

## **Summary of the sector**

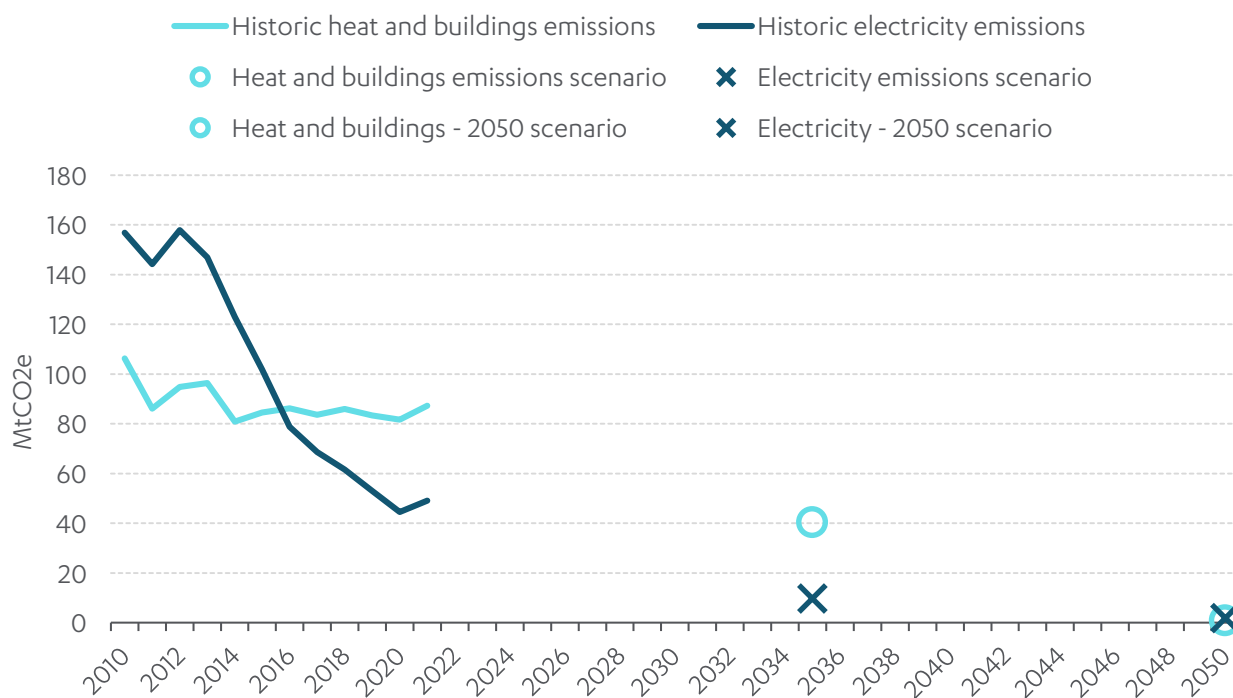
The energy sector covered by the Commission largely consists of two key networks: electricity and natural gas. Natural gas is used to generate electricity and to heat homes and businesses. This means that the UK's energy sector is highly reliant on imports from international markets – 57 per cent of the natural gas we use is imported.<sup>90</sup>

The sector also includes new infrastructure networks and technologies that will be required to decarbonise the country, such as hydrogen and engineered greenhouse gas removals.

Greenhouse gas emissions from the energy sector have reduced (figure 10), driven primarily by the successful move away from using coal to generate electricity. However, emissions remain too high, driven using gas for electricity generation and heating. Emissions from electricity need to fall to near zero by 2035, and emissions from heat need to reduce by around 50 per cent by 2035 from 2019 levels, and to near zero by 2050.

**Figure 10: Emission reductions have been driven by electricity in recent years**

*Actual and potential emissions in the government's net zero delivery pathways, United Kingdom*



Source: BEIS - Final UK greenhouse gas emissions (2021), Climate Change Committee Sixth Carbon Budget (2020)

The cost of energy to households and businesses has risen sharply, driven by rises in the price of gas which affects both the cost of electricity and heat. In the absence of government intervention, a typical household would pay £3,280 a year for their energy from April 2023.<sup>91</sup> This is an increase from an average bill of £1,277 a year between October 2021 and March 2022.<sup>92</sup>

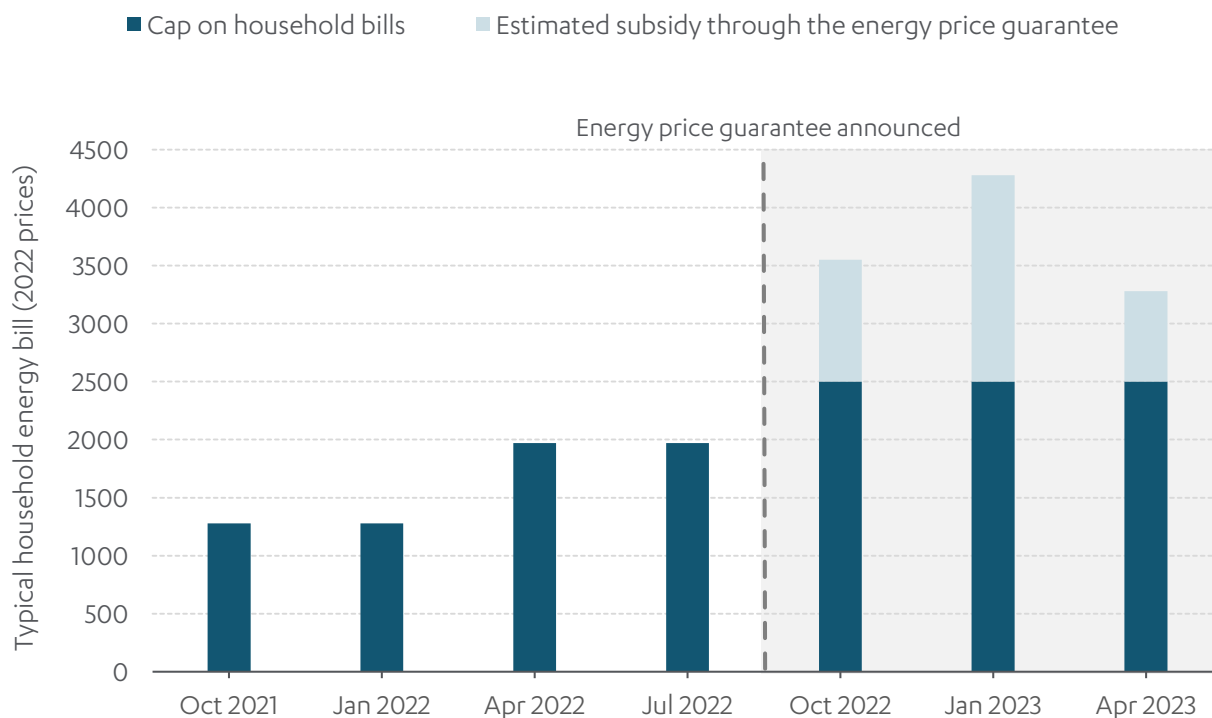
The government is now directly subsidising the energy consumption of households and businesses, setting prices for the average household at £2,500 per year between October 2022 and June 2023.<sup>93</sup>

The Office for Budget Responsibility estimated in March 2023 that the total cost of these and other measures to reduce energy bills will be £78.2 billion across 2022-23 and 2023-24.<sup>94</sup>

The Commission has set out a more detailed overview of the energy sector in *Second National Infrastructure Assessment: Baseline Report Annex B: Energy* and the Commission's data on sector performance is available online.

## Figure 11: Households have faced significant bill increases over the last year

*Ofgem price cap and government energy price guarantee estimates for a typical household paying bills by direct debit, October 2021 to present, United Kingdom*



Source: Ofgem

**Note:** Estimated subsidy is the difference between the government's energy price guarantee and Ofgem price cap

## Progress against the Commission's recommendations

### Electricity system

#### Key recommendations

In the first *Assessment*, the Commission stated that the UK could have a low cost and low carbon energy system, reducing the use of gas generation and replacing it primarily with wind and solar power.

The Commission recommended that government act to deliver 65 per cent of Britain's electricity from renewables by 2030.<sup>95</sup> Contracts for difference auctions should be used to deliver increases in renewable capacity, and auctions for onshore wind and solar should be reopened.

To support the deployment of a highly renewable electricity system, the Commission has set out:

- in its *Smart Power* study, government should increase the flexibility of the electricity system by increasing electricity interconnection and facilitating increased deployment of storage and demand side response.<sup>96</sup>
- in *Strategic Investment and Public Confidence*, regulators must ensure that their regulatory frameworks enable anticipatory investment where appropriate.<sup>97</sup> Anticipatory investment will be vital to ensure that there is sufficient transmission and distribution network capacity to manage the increases in demand as heat and transport decarbonises.

The Commission proposed taking a one by one approach to deploying nuclear power stations beyond Hinkley Point C and recommended that government should not agree support for more than one additional nuclear plant before 2025.

## Overview of key government policy

Much of the new government policy this year has related to the large increase in gas prices due to Russia's invasion of Ukraine. The government is directly subsidising household and business energy bills. Government has also implemented an excess profits levy on oil and gas producers, as well as a levy on the excess returns of non fossil fuel electricity generators.

The government has committed to fully decarbonise the power system by 2035, subject to security of supply. To deliver this, the target for offshore wind capacity in 2030 has been increased from 40 GW to 50 GW.<sup>98</sup> This would deliver around 220 TWh of generation in 2030, resulting in around half of the UK's electricity generation coming from offshore wind alone.<sup>99</sup> To support these targets government has:

- agreed to deliver annual contracts for difference auctions and has allowed onshore wind and solar projects to participate for the first time since 2015. The government is also consulting on planning changes that would loosen the effective ban on new onshore wind projects in England.<sup>100</sup>
- announced a Review of Electricity Market Arrangements and published a consultation on a range of options for electricity market design.

In 2021, the government and Ofgem published an updated Smart Systems and Flexibility Plan, which predicted that a tripling of low carbon flexibility capacity would be needed by 2030. The plan set out several actions to reduce barriers to deployment.

As part of this work, government launched a call for evidence in 2021 on the role for large scale, long duration electricity storage, recognising that is not currently attracting enough investment nor being built at sufficient scale. Government has since committed to making policy to de risk investment in large scale long duration electricity storage by 2024.<sup>101</sup>

Over the last year Ofgem has set the second round of electricity distribution network price controls. To meet the demands from a system with more electrified heat and transport, around £3 billion of funding has been made available for network upgrades.<sup>102</sup> In December 2022, a new framework for strategic transmission network upgrades was announced, which aims to streamline the process for key projects.<sup>103</sup>

The government has set an ambition for up to 24 GW of new nuclear power to be delivered by 2050.<sup>104</sup> The government is supporting investment in the new nuclear plant at Sizewell and has announced a £679 million investment in Sizewell C to support the project's development.<sup>105</sup>

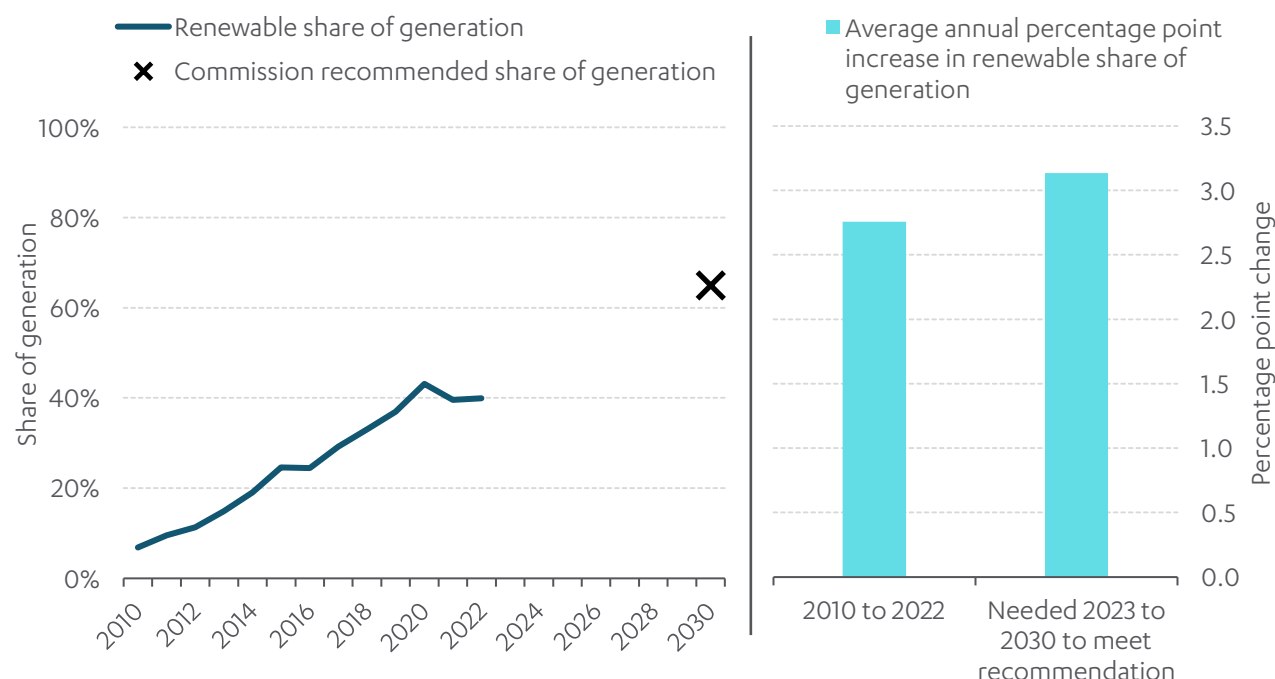
The government has set targets for reducing the time taken to build infrastructure. These include aspiring to halve the time it takes to develop offshore wind projects and to build new transmission infrastructure. The announced measures include bringing forward the energy National Policy Statements originally consulted on in 2021.

## Change in infrastructure over the past year

The share of electricity generated by renewables was 40 per cent in 2022. This is the highest share to date, except for 2020, which had higher average wind speeds.<sup>106</sup> The government remains broadly on track to deliver 65 per cent of renewables by 2030.

### Figure 12: Renewable deployment is broadly on track to deliver the Commission's recommendation

*Historic share of generation and Commission target of 65% by 2030 (left chart), Rates of change 2010 to 2030 (right chart), United Kingdom*



Source: BEIS - Energy Trends: UK renewables Renewable electricity capacity and generation (2022)

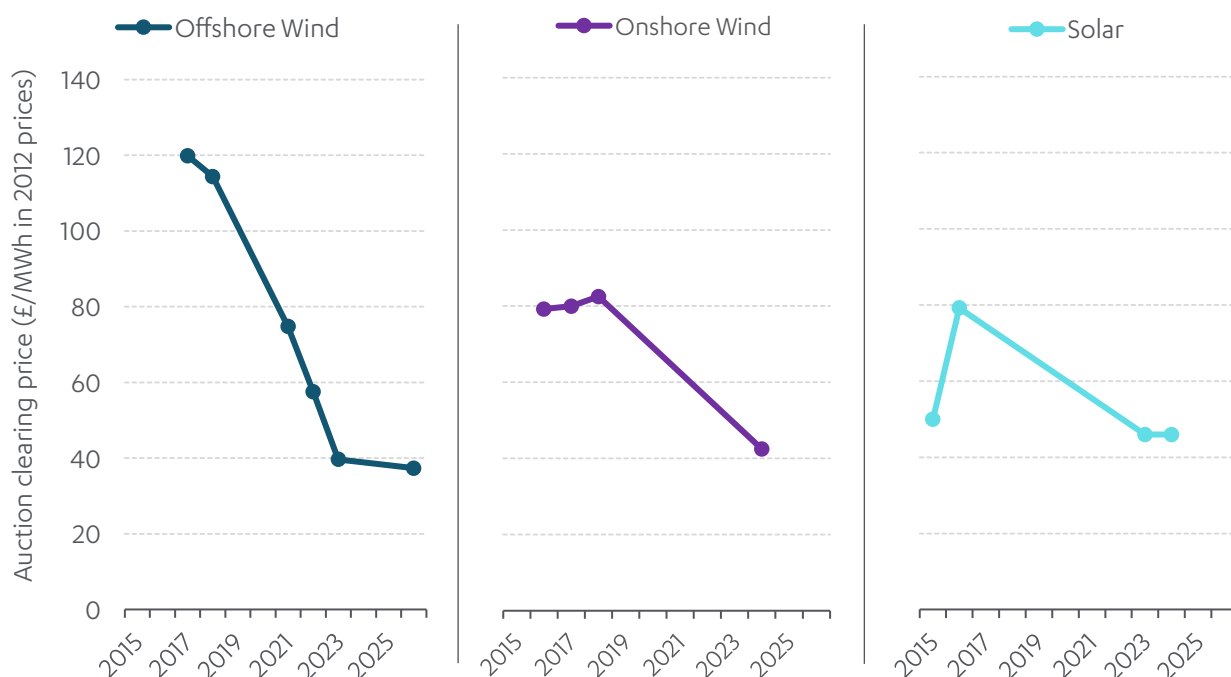
The government's contracts for difference scheme continues to deliver new renewable capacity at low prices. Last year's auctions awarded contracts to more than 10 GW of low carbon generation, including 7 GW of offshore wind and 2 GW of solar.<sup>107</sup> When built, these projects will generate 37 TWh of electricity per year.



In total, 17 GW of low carbon generation has contracts that are due to begin between now and 2027. If all these projects are built, they will generate 61 TWh of electricity per year – equivalent to a fifth of current generation. Prices have continued to fall, with offshore wind clearing at £37/MWh in 2012 prices. However, increases in financing costs may mean that future auction rounds cannot continue to deliver costs this low.

### Figure 13: The costs of key renewable technologies are continuing to fall

*Auction clearing prices in the government's Contracts for Difference scheme by delivery year*



Source: BEIS - Contracts for Difference Allocation Round results

The new nuclear plant at Sizewell continues to be developed. The project was granted development consent in July 2022. This replaces the need to obtain other consents, such as planning permission.

### Assessment of progress

Government is facilitating rapid deployment of renewable electricity generation and has ambitious commitments and policy in place to support delivery over the next decade. However, more progress is needed on ensuring that projects can be built and connected to the grid quickly. This should include reforms to the planning system and accelerated deployment of transmission infrastructure. There is also a need to support the adoption of new ways to cost effectively balance the system. The Review of Electricity Market Arrangements should bring forward routes to market for flexible technologies, including appropriate funding.

- **Taking a long term perspective: Met.** Government has set a long term strategy with a focus on significantly increasing renewable capacity. The government has also recognised the critical role of flexibility in delivering a decarbonised system.

- **Clear goals and concrete plans to achieve them: Partly met.** The government has set a clear goal of a fully decarbonised electricity system by 2035, with generation capacity to be delivered through contracts for difference auctions. Government is taking action to support the development of flexibility solutions and is working to fill gaps in policy through the Review of Electricity Market Arrangements, but there is a risk to delivery of this if policy is not brought forward at pace. Government needs to ensure that investment can take place at sufficient scale and pace to meet these plans.
- **Firm funding commitment: Partly met.** The contracts for difference scheme has given certainty to developers of renewable generation, and the current pipeline of planned low carbon generation underlines industry confidence in government funding. However, additional funding will be needed to deploy flexibility solutions to ensure security of supply. The Review of Electricity Market Arrangements must ensure these technologies have routes to market.
- **Genuine commitment to change: Partly met.** The government has accepted the Commission's recommendations of a highly renewable system. However, the uncertainty around building onshore wind and solar in England has undercut the government's commitment to deploy renewable generation. Government is also yet to put in place a plan for replacing the role of gas in the electricity system. Government should ensure all technologies to support a decarbonised electricity system can play their part.
- **Delivery on the ground: Partly met.** The government is on track to reach the level of renewable deployment recommended by the Commission (figure 12). However, delivery is a major challenge. The government should bring forward the promised reforms to allow projects to be built more quickly, including the long overdue updates to the National Policy Statements. The Commission will publish its study on the infrastructure planning system shortly and government should rapidly progress its recommendations. Transmission infrastructure is also becoming a significant blocker to action. Government and Ofgem must act urgently to ensure that sufficient network capacity can be delivered to support the deployment of renewables.

## Energy efficiency and heat

### Key recommendations

Energy price rises over the last year have made action on energy efficiency even more important. Targeted energy efficiency improvements are one of the best ways to reduce gas use in homes. Energy efficiency upgrades can quickly reduce bills for consumers, while improving comfort and reducing carbon emissions.

The Commission's recommendation sought to increase the rate of energy efficiency installations across homes, with government providing funding to support delivery to those in social housing.<sup>108</sup> The Commission recommended that government set a target of 21,000 measures a week for installations of energy efficiency measures in England.<sup>109</sup>

Recommended policies to support this included funding of £3.8 billion up to 2030 for improvements in social housing, as well as trialing innovative approaches for driving energy efficiency in owner occupied homes and tightening regulations and enforcement in the private rented sector.

Moving away from gas heating will be essential in reducing gas use in homes in the longer term. In the first Assessment the Commission found that a low cost low carbon heating system could be delivered, but that there was significant uncertainty in the future costs and performance of heat pumps and hydrogen boilers. To address this, the Commission recommended running a trial to supply hydrogen to at least 10,000 homes by 2023 and establishing an evidence base on the performance and cost of installing heat pumps within the building stock.

## Overview of key government policy

In the 2022 Autumn Statement, the government announced an ambition to reduce energy use in buildings and industry by 15 per cent by 2030, compared to 2021 levels.<sup>110</sup> The government also has an energy efficiency target for as many homes as possible to meet EPC Band C by 2035, with fuel poor homes meeting the same standard by 2030.

To deliver energy efficiency improvements the government has several existing schemes for social housing, public sector buildings, and low income households who are off the gas grid. In November 2022, £6 billion of additional funding was announced for energy efficiency between 2025 and 2028.<sup>111</sup> It is not yet clear how this funding will be allocated. Currently committed spending represents a fraction of the investment needed to meet the government's EPC C by 2035 target, which the government has estimated will cost £35 – 65 billion.<sup>112</sup>

The fourth round of the Energy Company Obligation (ECO) scheme was opened in July 2022. This allocates £4 billion of funding for energy efficiency measures, paid for and delivered by energy suppliers. This will reduce bills in 450,000 low income and fuel poor households between 2022 and 2026.<sup>113</sup> The ECO+ extension to the scheme was announced in November 2022, and allocated an additional £1 billion to fund upgrades to 400,000 inefficient properties, most of which would not previously have been eligible for support.<sup>114</sup>

The government has set a target of 600,000 heat pump installations a year by 2028,<sup>115</sup> and has set out some policies to deliver this. The government plans to introduce the Future Homes Standard for new build homes, which will require new build homes to be installed with low carbon heating from 2025. The Boiler Upgrade Scheme opened to applications in May 2022, offering grants of up to £5,000 for households in England and Wales that install air source heat pumps.<sup>116</sup> Finally, the government plans to introduce an obligation on manufacturers of fossil fuel heating appliances to also sell a specified number of heat pumps.

The government also plans to decide on the role of hydrogen in heat by 2026. To inform this decision, a neighbourhood trial of hydrogen for heat is due to start by 2024, with a large village trial by 2025.<sup>117</sup>

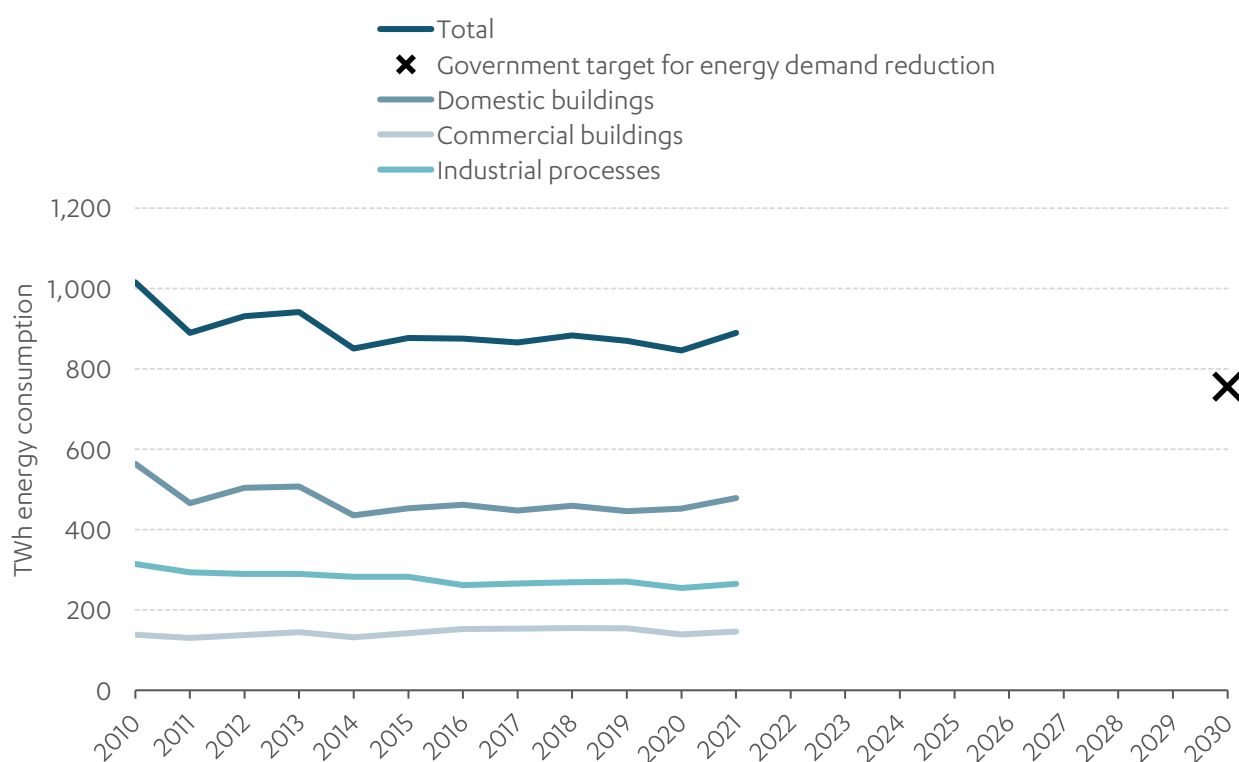
## Change in infrastructure over the past year

Energy demand from domestic buildings has plateaued since the mid 2010s, although demand from commercial buildings and industrial processes has fallen. The proportion of houses with an EPC C rating has increased, but this has not translated into reduced demand.<sup>118</sup>

This will, in part, be due to an increase in the housing stock but could also reflect the scaling back of government energy efficiency schemes in 2014.<sup>119</sup> The proportion of homes with loft insulation, cavity wall insulation and solid wall insulation, which would reduce energy demand, has not significantly increased since this time.<sup>120</sup>

### Figure 14: Energy demand has fallen over the last ten years, this needs to continue

*Total energy consumption from domestic and commercial households and industrial processes 2010 to 2021 and government 2030 target, United Kingdom*

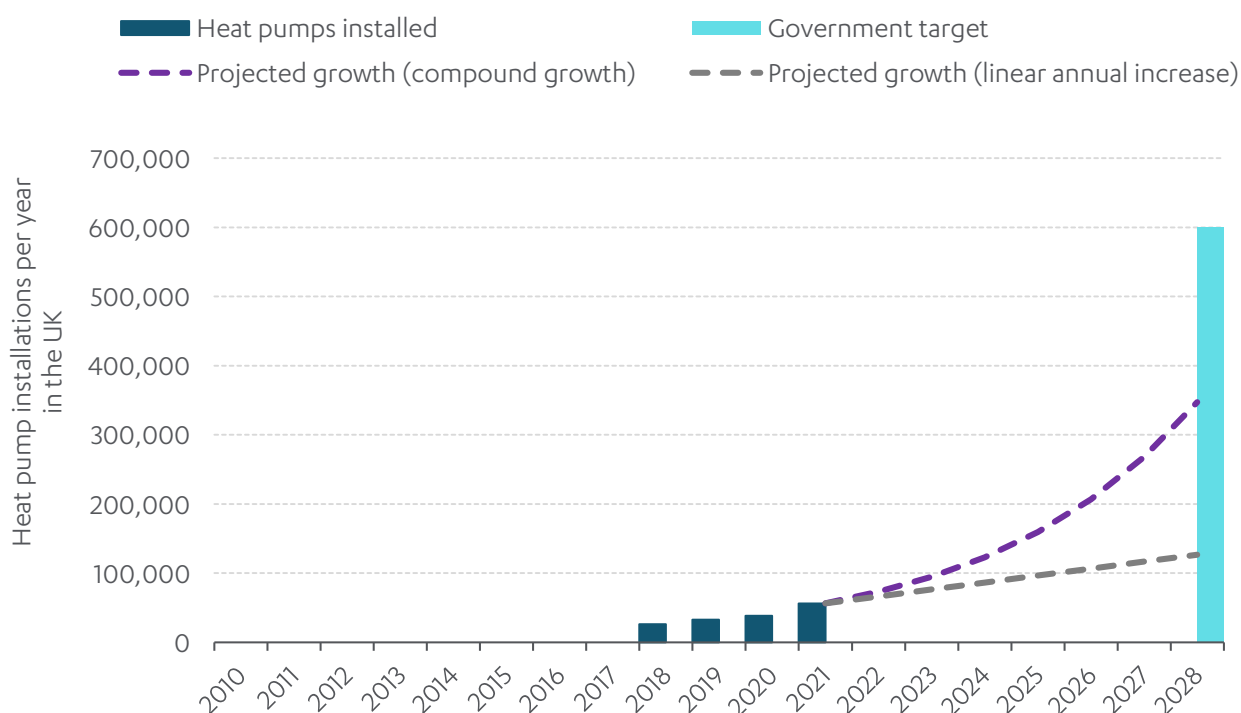


Source: DUKES - Table 1.1, Table 1.1.5 (2022)

Heat pump sales remain very limited compared to installations of fossil fuel boilers, with around 55,000 heat pump installations in 2021.<sup>121 122</sup> Even if the market continues to grow at 30 per cent each year, the target for 600,000 heat pump installations per year will not be met (figure 15).

**Figure 15: Heat pump installations are growing, but the government’s target is unlikely to be met**

*Number of heat pump installations in buildings, 2018 - 2021, United Kingdom*



Source: CCC Monitoring Framework (2022), The Ten Point Plan for a Green Industrial Revolution (2020)

**Note:** Linear growth based on historic average annual increase in total installations, projected forward to 2030. Compound growth based on average annual percentage growth in installations between 2019 and 2021, projected forward to 2030.

## Assessment of progress

Government is not on track to deliver its commitments on heat or energy efficiency. Energy efficiency installations are too low. A concrete plan for reducing energy demand is required, with a particular focus on driving action in homes and facilitating the investment needed. There is not a robust plan to deliver the heat transition. Key policies remain missing, and government funding is insufficient to deliver the required change. These challenges must be urgently resolved to meet the Sixth Carbon Budget.

- **Taking a long term perspective: Partly met.** Government has set targets for demand reduction and improving the energy efficiency of buildings – though it is not clear how these targets align. It has also committed to decide on the role of hydrogen in home heating by 2026. However, the government needs to set out more detail on how the heat transition will take place and how it will be funded.
- **Clear goals and concrete plans to achieve them: Not met.** A concrete plan is needed for improving energy efficiency in homes, particularly in driving action for owner occupiers and the private rented sector. The government should tighten the energy efficiency regulations in the private rented sector in line with the recommendation in the first Assessment. There are still major questions about how the heat transition will

be delivered, and government has not made progress in answering these beyond the targets set out in the Heat and Buildings Strategy in 2021. Several key elements of the strategy are still missing detailed policies, including the planned low carbon heating obligation on boiler manufacturers.

- **Firm funding commitment: Not met.** The government's funding announcements for energy efficiency are material but will not be sufficient to deliver the upgrades that will be required. Government will either need to spend more, set out non fiscal measures to drive improvements, or accept a lower level of energy efficiency in buildings than its targets imply. There is no long term plan for the amount of government funding that will be required to deliver the transition to low carbon heat. In particular, the Boiler Upgrade Scheme is too small and too short term to materially scale up heat pump deployment.
- **Genuine commitment to change: Not met.** The government has made clear that change will be needed through the net zero target and interim Carbon Budgets. However, the pace of change is currently too slow to deliver the needed reduction in emissions in this area, and the scale of current and proposed policies, such as the Boiler Upgrade Scheme, are not sufficient to bring installations back on track to meet the Sixth Carbon Budget.
- **Delivery on the ground: Not met.** The government's current energy efficiency schemes are delivering too few upgrades. The number of installations will need to increase significantly for a material improvement in the number of homes meeting EPC C by 2035. The number of heat pump installations also remain well below the level that would be consistent with delivery of 600,000 installations a year by 2028.

## New infrastructure networks

### Key recommendations

In the study on *Engineered greenhouse gas removals*, the Commission recommended that government commit to deploying a range of engineered removals technologies to remove between 5 and 10 MtCO<sub>2</sub>e per year by 2030 and publish a detailed plan in 2022 to support deployment.<sup>123</sup> The Commission also recommended that government deliver sufficient carbon transport and storage networks to serve engineered greenhouse gas removals plants.

### Overview of key government policy

In July 2022, the government responded to the Commission's *Engineered greenhouse gas removals* study, and fully or partially accepted all the recommendations. The government's ambition is to store 5 MtCO<sub>2</sub>e each year through engineered greenhouse gas removals by 2030.<sup>124</sup>

The government has consulted on the design of a business model for engineered removals to deploy at scale, and is analysing the feedback, with an intention to set out detailed policy proposals in 2023.

The government has consulted on a business model for biomass with carbon capture and storage in the power sector and has issued a call for first of a kind projects that could be operational by 2027. Deployment of these projects would also contribute towards achieving the government's 5 MtCO<sub>2</sub>e ambition.

Carbon capture and storage and hydrogen can be used to replace unabated gas across a range of sectors, reducing carbon emissions. The government has developed the Dispatchable Power Agreement business model for CCS in the power sector.<sup>125</sup> In March 2023, the government announced that they would make up to £20 billion of funding available to support deployment of carbon capture and storage projects.<sup>126</sup> Government has also opened applications for revenue support for hydrogen production, as well as grant funding to support the costs of developing hydrogen projects.<sup>127</sup>

## Assessment of progress

The ambition for engineered removals is positive. A detailed plan and funding are now required to allow the sector to deliver at scale.

- **Taking a long term perspective: Met.** Government has begun to set out long term targets for engineered removals deployment. It now needs to bring forward a detailed plan and firm business model to support the sector to deliver these targets.
- **Clear goals and concrete plans to achieve them: Not met.** While government has consulted on business models, there has not been a detailed plan for delivering engineered removals in line with the Commission's recommendation to deliver this by the end of 2022. The government needs to set this out to enable the sector to develop.
- **Firm funding: Partly met.** The government has not yet brought forward a firm funding envelope for engineered greenhouse gas removals. However, the government has brought forward funding schemes for power bioenergy with carbon capture and storage, as well as carbon capture and storage infrastructure, hydrogen, and industrial carbon capture.
- **Genuine commitment to change: Met.** The government has committed to deploying engineered greenhouse gas removal technologies and consulted on the business model's design features. Government now needs to set out delivery and funding plans to ensure deployment takes place.
- **Delivery on the ground: Not applicable.** Greenhouse gas removals are a nascent technology and there is no relevant delivery on the ground to discuss in the context of the Commission's current recommendations.



# Floods resilience

**More than five million homes and properties in England are in areas at risk of flooding, and climate change means the risk is growing. National policies to manage flood risk have been strengthened and investment has doubled. The government did not accept the Commission's recommendation on national flood protection standards but has yet to specify an adequate alternative long term goal.**

There have been positive changes in flood resilience policy since the first *National Infrastructure Assessment* was published. In line with the Commission's recommendations, government investment in measures to reduce the risk of flooding has doubled and policies have been revised to emphasise catchment based planning, green infrastructure, and property level resilience. But government has yet to define measurable long term targets for flood resilience. Until it does so, policies and investment are unlikely to fully address the flood risk challenges the Commission identified in the first Assessment. Following the Commission's recently published study on surface water flooding the government has already set out its intention to implement Schedule 3 of the Floods and Water Management Act 2010.

## **Actions for 2023**

- Implement Schedule 3 of the Floods and Water Management Act 2010 this year and without delay.

## **The flood resilience sector**

In 2022, more than five million properties in England were in areas at risk of flooding,<sup>128</sup> although the level of risk differs by area. Around two million properties are in areas with at least a low<sup>129</sup> risk of flooding from rivers and the sea<sup>130</sup> and around three million in areas at risk from flooding from surface water.<sup>131</sup> Over 65 per cent of properties in England are served by infrastructure located in areas at risk of flooding, although this does not account for existing flood resilience measures at specific infrastructure asset sites.<sup>132</sup>

**Figure 16: Numbers of properties in areas at high, medium, and low risk of flooding by different flood risk categories**

|  | Surface water flooding | Flooding from rivers and the sea |
|--|------------------------|----------------------------------|
| <b>Number of properties at low risk (1 in 1000 to 1 in 100 annual risk of flooding)</b>  | 2,348,000              | 1,020,000                        |
| <b>Number of properties at medium risk (1 in 100 to 1 in 30 annual risk of flooding)</b> | 499,000                | 633,000                          |
| <b>Number of properties at high risk (1 in 30 or more annual risk of flooding)</b>       | 326,000                | 189,000                          |

Currently, there is no comprehensive way to measure whether the level of flood resilience in England has improved over past years. The Environment Agency uses the number of properties ‘better protected’ as a key indicator of flood risk management investment outcomes. ‘Better protected’ means that properties have been moved to a lower risk category through improved flood risk management.<sup>133</sup> The government’s investment between 2015 and 2021, which equated to £2.6 billion, improved protection for over 300,000 homes.<sup>134</sup> For the period 2021 to 2027 its target of 336,000 includes all property types. Although this is an easy to understand measure of performance it still does not take account of the protection of infrastructure and so provides a limited view of overall progress in tackling flood risk. Furthermore, it does not account for reduced levels of protection due to deterioration of flood protection assets or the increased risk of flooding due to climate change.<sup>135</sup>

The Commission has set out a more detailed overview of the floods sector in the *Second National Infrastructure Assessment: Baseline Report Annex C: Flood Resilience* and the Commission’s data on the performance of the sector is available online.

## Progress against the Commission’s recommendations

### Commission recommendations

Although flood resilience policy in England has emphasized the need for strategic systems approaches for at least 30 years, too often it has been reactive and piecemeal in nature, with unclear targets and stop start funding cycles.

In the first Assessment, the Commission recommended that government introduce a national flood protection standard, such that by 2050 all communities would be resilient to flooding events with an annual likelihood of 0.5 per cent (one in 200 years). In densely populated areas, where the costs per household of providing protection are lower and the risk of cascading

failures resulting in widespread impact higher, the Commission proposed a higher standard of protection against flood events with an annual likelihood of 0.1 per cent (one in 1,000 years).<sup>136</sup> These standards, as they have in relation to resilience to drought, would provide focus for risk management authorities and enable clearer monitoring of local and national progress. To deliver this, the Commission recommended that government put in place a rolling six year funding programme. There remains a strong case for government to set multiyear investment programmes to avoid a return to reactive funding, where budgets are reduced only to increase again following flood events.

To support the development of a long term strategy the Commission also recommended that:

- the Environment Agency should update plans for catchments and coastal cells by the end of 2023
- new developments should be resilient to flooding and not increase risk elsewhere
- water companies and local authorities should work together to publish joint plans to manage surface water flood risk by 2022.<sup>137</sup>

### **Box 1: Surface water flooding study**

The government commissioned the National Infrastructure Commission to undertake a study into effective approaches to manage surface water flooding.<sup>138</sup> The Study reported in November 2022.<sup>139</sup> Surface water flooding is a potential risk to many homes and businesses in England. Currently around 325,000 properties are in areas at the highest risk which means there is a more than 60 per cent chance they will flood in the next 30 years. Without action, up to 295,000 more properties could be put at risk from an increase in impermeable surfaces and climate change. Modelling carried out on behalf of the Commission indicates that investing about £12 billion over 30 years in cost effective drainage infrastructure measures could reduce the number of properties that would otherwise be at high risk of surface water flooding in 2055 by around 60 per cent.

The report sets out the need to better identify the places most at risk and to reduce their number of properties at risk. This will mean devolving funding to local areas at the highest risk and supporting them to make long term strategies to meet local targets for risk reduction.

At a national level, the Environment Agency should expand its strategic oversight role in relation to surface water flooding to identify places at risk and ensure the rigour of proposed plans for alleviating surface water flood risk. It will also be vital that Ofwat enables water and sewerage companies, who own and operate underground drainage on which many urban areas rely, to invest in solutions to address surface water flooding, including nature based drainage systems. This will require them to work closely with local authorities to protect the people in the areas they serve.

Such an approach should follow a hierarchy starting with reducing the amount of water that enters drains in the first place, before looking at building new infrastructure to increase future drainage capacity below the ground. The report sets the following recommendations:

- **Recommendation 1:** By the end of 2023, government should implement Schedule 3 of the Flood and Water Management Act 2010 and update its technical standards for sustainable drainage systems.
- **Recommendation 2:** Government should undertake a comprehensive review of the effectiveness of all available options to manage unplanned increases in impermeable (or hard) surfaces, and their costs and benefits. By the end of 2024, government should decide whether policy changes are required to reduce the impacts on surface water flooding or adjust investment levels for flood risk reduction accordingly.
- **Recommendation 3:** Government should:
  - require the Environment Agency to use the results of the second National Flood Risk Assessment in 2024 to identify new flood risk areas
  - from 2025, require upper tier local authorities, water and sewerage companies, and other relevant authorities in the new flood risk areas to, where necessary, develop detailed local risk maps that can be integrated into the Environment Agency’s national map, and models that can be used to plan future management of surface water flooding.
- **Recommendation 4:** By early 2025, government should set a long term target for a percentage reduction in the number of properties at high and medium risk of surface water flooding.
- **Recommendation 5:** The government should require risk management authorities in the new flood risk areas to agree appropriate local targets by mid 2025.
- **Recommendation 6:** Government should clarify in its strategic priorities for Ofwat that it should enable water and sewerage companies to invest in solutions to manage surface water flooding including sustainable drainage.
- **Recommendation 7:** Government should require:
  - upper tier local authorities, water, and sewerage companies, and, where relevant, internal drainage boards in the new flood risk areas to produce and deliver costed, joint investment plans for managing surface water that achieve the agreed local objectives and follow the ‘solutions hierarchy’
  - the Environment Agency to review and assure the final plans with input from Ofwat and support from Regional Flood and Coastal Committees, and publish data on progress against local and national targets
  - joint plans to be completed by 2026 and revised every five years following the review of flood risk areas the year before, and to inform the following Ofwat Price Review.

- **Recommendation 8:** By the end of 2025, government should devolve public funding to upper tier local authorities in or containing new flood risk areas, based on the Environment Agency's assessment of the levels of risk in each new flood risk area. The funding allocation should be reviewed every five years, in line with single joint plan cycles.
- **Recommendation 9:** By the end of 2024, government should explore options for funding property level measures for those properties that remain at high risk of surface water flooding because improving drainage infrastructure is not cost effective.

These recommendations build on the Commission's recommendation in the first National Infrastructure Assessment that water companies and local authorities should work together to publish joint plans to manage surface water flood risk by 2022. Whilst the draft Drainage and Wastewater Management Plans are a positive step in better managing drainage, which can reduce surface water flood risk, they do not represent the single joint plans envisaged by the Commission. The Commission welcomes the government's intention to implement schedule 3 of the Floods and Water Management Act 2010 which addresses the first recommendation in the study.<sup>140</sup>

As the report was published in November 2022 the government has not yet formally responded to all the recommendations. The Commission will track the government's progress in future Infrastructure Performance Reviews.

## Government policy

In the Flood and Coastal Erosion Risk Management Policy Statement, the government set out how it plans to make the nation more resilient to flood and coastal erosion risk, using green and grey infrastructure, and delivering resilience measures at the property level, as recommended by the Commission.<sup>141</sup>

However, government did not set national standards for flooding resilience, or a clear long term targets for what it is trying to achieve. The government argued that developing national standards would be complicated and resource intensive, and that differing levels of current flood resilience require a more tailored local approach. Instead, it committed to developing a national set of flood resilience indicators that will enable better monitoring of changes in flood resilience over time.<sup>142</sup> The government published a research report on measuring resilience to flooding and coastal erosion in November 2022.<sup>143</sup> This has identified several potential indicators, including protection from flooding, which can show changes in resilience over time. Whilst not the same as setting a standard of protection they could still be used to set long term targets. The government expects to publish its next steps to develop a national set of indicators later this year.

The government will also invest £5.2 billion between 2021 and 2027 to better protect communities across England from the risk of flooding and coastal erosion. This investment aims to ‘better protect’ 336,000 properties by 2027.<sup>144</sup> In 2020 it also announced a £200 million innovation fund to test and develop new ways to create a nation more resilience to flooding.<sup>145</sup>

In addition, further progress has been made in developing the detail of government’s policy approach in the last year:

- announced a £100 million fund, ring fenced from the £5.2 billion capital programme, to boost schemes in areas that are impacted repeatedly<sup>146</sup>
- the government has indicated intention to implement Schedule 3 of the Floods and Water Management Act 2010
- the government published significantly updated planning guidance to improve consideration of flood risk to and caused by new development<sup>147</sup>
- the Environment Agency published a Flood and Coastal Erosion Risk Management Strategy Roadmap in June 2022<sup>148</sup> to demonstrate how it will continue to drive action in the National Flood and Coastal Erosion Risk Management Strategy for England<sup>149</sup>
- the Environment Agency published updated Flood Risk Management Plans for the period 2021 to 2027 in December 2022<sup>150</sup>
- water and sewerage companies published their draft Drainage and Wastewater Management Plans in the summer of 2022.<sup>151</sup> Final plans will be published by May 2023.

## Assessment of progress

Over the past year, the government has published further details on how the £5.2 billion it has allocated between 2021 and 2027 to reduce flood and coastal erosion will be invested. However, without clear targets for flood resilience and long term plans to deliver them, the government is unlikely to deliver nationwide resilience to flooding by 2050. It should therefore set out the level of flood resilience it wishes to achieve by 2050, and clarity on the long term funding to deliver this. The new flood resilience indicators, published in November 2022, could provide the basis for setting such targets and for measuring performance against them.

- **Taking a long term perspective: Not met.** Whilst the Environment Agency has published long term investment scenarios,<sup>152</sup> the government has set out neither targets nor investment plans for flood resilience beyond 2027, as the Commission recommended.
- **Clear goals and concrete plans to achieve them: Not met.** Government has set itself a goal of ‘better protecting’ 336,000 properties by 2027, although this measure does not reflect the number of properties that may have less protection each year due to flood asset deterioration or climate change. Government does not have any measurable, long term targets for flood resilience beyond 2027. The new flood resilience indicators could provide a rigorous basis for assessing whether its policies and investment are delivering better resilience for communities across the country.

- **Firm funding commitment: Met.** Government has allocated £5.2 billion, between 2021 and 2027, to reduce the risk of flooding, which represents a doubling of investment over the previous six year period. This will provide risk management authorities with clarity on funding and enable better forward planning of investment.
- **Genuine commitment to change: Not met.** Until government sets out long term plans, including measurable targets, to maintain and improve nationwide flood resilience and the role of flood infrastructure in providing protection by 2050, its actions will not constitute a genuine commitment to change.
- **Delivery on the ground: Partly met.** The Environment Agency and other Flood Risk Management Authorities, continue to deliver flood resilience schemes, with initial design and construction work on more than 1,000 schemes starting in 2021-22.<sup>153</sup> However, the available data suggests the Environment Agency failed to meet its annual target for properties better protected.<sup>154</sup> A number of reasons have been identified for this including: continued effects of the pandemic, winter flood events and Storm Arwen, supply chain disruption, and cost pressures and inflation across the construction sector.



# Water

**The Summer 2022 drought demonstrates the risk of water shortages due to climate change and population growth. Since the first National Infrastructure Assessment the water industry has developed more ambitious plans to enhance the resilience of water supplies. Positive progress has been made on leakage, with rates continues to fall, but much more progress is needed. There is no sustained fall in individual consumption and stronger policies will be needed to address this.**

In the first *National Infrastructure Assessment*, the Commission recommended addressing the growing risk of water shortages through a ‘twin track’ approach: to reduce demand and increase supply. To deliver this, the Commission called for ambitious targets for leakage reduction, compulsory smart metering, the creation of additional supply and a national water transfer network.

Industry plans are consistent with the Commission’s recommendations on demand, leakage, and new supply. But these plans now need to be delivered on the ground, especially given water companies are not yet achieving their ambitions on demand for the 2020-25 investment period. Longer term demand reduction is also partially dependent on government action, and it is not clear that current government policies on water efficient homes and water efficient product labelling will achieve this.

## Priority action for 2023

- Rapidly put in place plans to support industry to reduce per person water consumption to 110 litres per day by 2050, starting by finalising proposals on water efficiency labelling and setting out timelines for action on water efficient buildings.

## The water sector

The water industry delivers reliable quality water to homes and businesses across the country. Average water bills in 2022-23 rose by 1.7 per cent, below the annual rate of inflation.<sup>155</sup> The industry also provides sewage and wastewater services, though these were not examined in the first National Infrastructure Assessment. Significant drinking water quality incidents are rare<sup>156</sup> and unplanned interruptions to water supply have fallen by one third since 2012.<sup>157</sup> However, over the coming decades the UK faces a real and growing risk of water shortages, especially in the south east of England, as seen in summer 2022.<sup>158</sup> Too much water is being abstracted from some environmentally sensitive rivers and aquifers, so alternative sources need to be found.

In the first Assessment, the Commission found that maintaining current levels of water supply resilience until 2050 in the face of rising population, environmental and climate pressures, would require additional capacity of about 2,700 to 3,000 million litres per day in England.<sup>159</sup> Additional capacity required to protect the UK from extreme drought (0.2 per cent annual chance) is between 3,500 and 4,000 million litres per day.<sup>160</sup>

The water industry manages these and other challenges through 5 yearly planning cycles including Water Resource Management Plans and Drainage and Wastewater Management Plans. All these feed into water company business plans which are assessed by the economic regulator Ofwat's price reviews which determine water company investment over a five year period. The next price review, in 2024, will cover the period 2025-30.

The Commission has set out a more detailed overview of the water sector in *Second National Infrastructure Assessment: Baseline Report Annex D: Water and wastewater* and the Commission's data on sector performance is available online.

### **Box 2: Water quality**

Water quality has improved over the last few decades, but progress has now stalled. Only 14 per cent of rivers meet the criteria for good ecological status and the number of serious pollution incidents due to water and sewerage companies increased in 2021 to the highest level since 2013.<sup>161</sup> The impact of water companies on the environment remains a concern for the public, especially in relation to the discharge of untreated sewage into rivers and seas. The latest available data, for 2021, highlights that 90 per cent of storm overflows discharged sewage at least once in the year and five per cent discharged at least 100 times, including at Sites of Special Scientific Interest.<sup>162</sup> This harms the environment, can be dangerous for bathers and damages public trust in water industry performance.

In 2022 the government published a Storm Overflows Discharge Reduction Plan to support the industry to address this issue. Action on storm overflows will need to be coordinated with the action the Commission has called for on surface water flooding to ensure value for money for bill payers. This action is further supported by the Water Industry National Environment Programme through which the Environment Agency has tasked water companies with addressing environmental improvement more broadly.

## **Progress against the Commission's recommendations**

### **Commission recommendations**

In the first Assessment, the Commission set out a vision for water supply infrastructure in 2050 that would deliver resilience to extreme drought despite rising environmental, population, and climate pressures. The Commission proposed a 'twin track' approach — reducing demand

while increasing supply — that would deliver additional capacity of 4,000 million litres per day by 2050. Leakage reduction, efficiency and smart metering, and new supply infrastructure could each provide around a third of the capacity required.<sup>163</sup>

To deliver this vision, the Commission recommended that:

- government should set an objective for the water industry to halve leakage by 2050, with Ofwat agreeing five year commitments for each company
- government should legislate to enable compulsory metering beyond water stressed areas, and to require all companies to consider systematic roll out of smart meters
- Ofwat should launch a competitive process so that at least 1,300 million litres per day is provided through a national water network and additional supply infrastructure by the 2030s.<sup>164</sup>

## Government policy

In the National Infrastructure Strategy, the government acknowledged the long term challenge of drought resilience and endorsed the Commission's recommended level of drought resilience for 2050.<sup>165</sup> It has also issued an updated Strategic Policy Statement for Ofwat calling on the regulator to increase drought resilience in line with the Commission's recommendation and support the 'twin track' approach by managing demand and increasing supply.<sup>166</sup>

The sector is taking action to tackle leakage: at the 2019 Price Review, water companies agreed to reduce leakage by an average of 16 per cent by 2025<sup>167</sup> and to halve leakage by 2050.<sup>168</sup> Planned leakage reduction activity includes installing sensors in water pipes, replacing mains which are more likely to burst, water pressure management, and working with customers to find and fix leaks in pipes on their property.<sup>169</sup>

Government has set interim targets for 2037-38 through the Environment Act 2021. These are set on a trajectory towards reducing household consumption to 110 litres per person per day, non household consumption by nine per cent and leakage by 50 per cent by 2050.<sup>170</sup> Government did not accept the Commission's recommendations on reducing water consumption through mandatory metering, though its Environmental Improvement Plan in 2023 committed to accelerating investment in smart meters over the next decade. Instead of compulsory smart metering, the government announced alternative measures to reduce consumption, including:

- designating additional 'areas of serious water stress', where water companies can introduce charging by compulsory metering where this is cost effective and has customer support
- consulting on introducing mandatory water efficiency labels on domestic and business use products in 2022, without minimum product standards<sup>171</sup>
- publishing a roadmap on water efficiency in new developments and retrofits, looking at the long term needs of the industry, published as part of the Environmental Improvement Plan in January 2023

- ‘encouraging’ local authorities to voluntarily adopt a tighter standard of 110 litres per person per day for new build homes where appropriate, versus the current 125 litres.

Water companies take forward action on leakage, demand, and new supply in five yearly Water Resource Management Plans. These plans cover a 25 year time horizon enabling water companies to align five year investment plans with longer term ambitions.

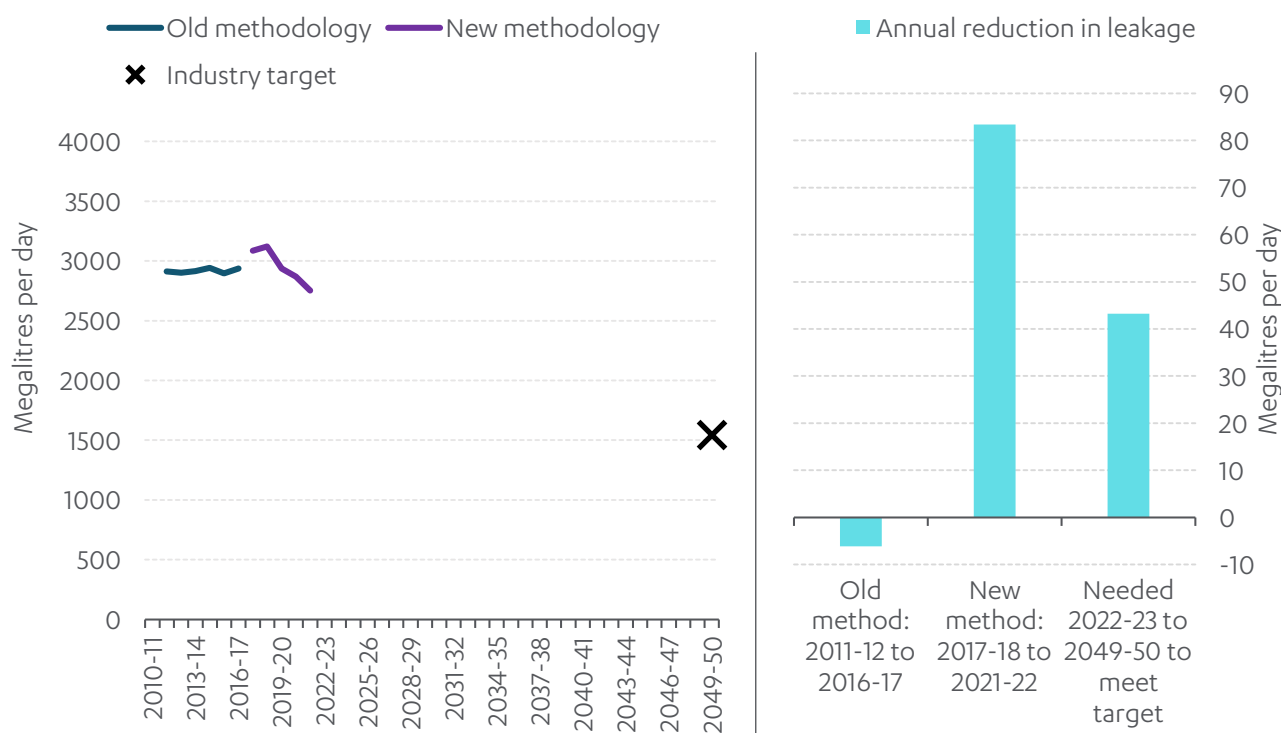
The sector is working to develop additional supply infrastructure and to increase the use of water transfers. At its 2019 Price Review, Ofwat allocated £469 million for companies to develop proposals for new infrastructure to address drought challenges.<sup>172</sup> It has also established a new Regulators’ Alliance for Progressing Infrastructure Development (‘RAPID’), alongside the Environment Agency and the Drinking Water Inspectorate. RAPID aims to accelerate the delivery of new supply infrastructure by identifying and removing regulatory and commercial barriers.<sup>173</sup> RAPID has used national modelling to analyse strategic resource options. The draft Water Resource Management Plans propose twelve new reservoirs in the next 25 years, alongside desalination plants, water recycling plants, reservoir extensions and water transfers.<sup>174</sup> For the first time water companies have also produced regional plans, allowing better coordination between companies in addressing the challenge. This is a step change in action compared to the last 30 years, when no new public water supply reservoirs were built and only one desalination plant, one recycling plant and one reservoir extension were completed.

## Change in infrastructure over the past year

There has been some change in the country’s water infrastructure over the past year. Leakage has fallen by eleven per cent in five years, and four per cent in the past year.<sup>175</sup> This progress has been achieved through a range of measures including increased leakage detection using smart meters, pressure management, and working with customers to identify leaks on their property. Work has also continued on some supply infrastructure, such as Anglian Water’s strategic pipeline moving water from wetter to drier parts of its region.

**Figure 17: Leakage rates have begun to fall, but continued progress is needed to deliver the Commission’s recommendation**

*Historic and target leakage rates 2011-12 to 2049-50 (left chart), Rates of change 2011-12 to 2049-50 (right chart), England*

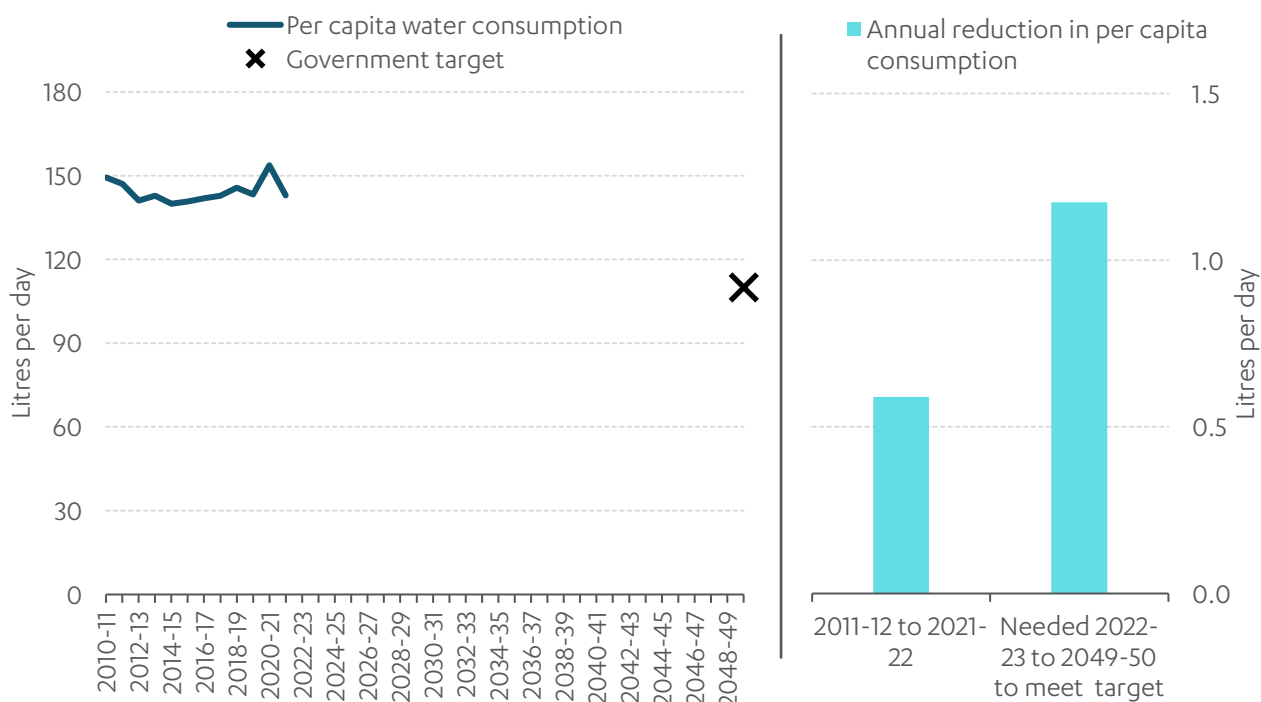


Source: Ofwat - PR24 Cost Assessment Master Dataset

**Note:** For Price Review 2019 Ofwat change the methodology for reporting leakage. This was based on a review of common performance commitments for Ofwat and Water UK. This review found several issues with the existing methodology and proposed a range of proposals for improvement. More detail can be found at Ofwat (2019), [Reporting guidance – Leakage](#)

**Figure 18: Water consumption needs to fall rapidly over the next 28 years**

*Historic and target consumption rate 2010-11 to 2049-50 (left chart), Rates of change 2011-12 to 2049-50 (right chart), England*



Source: Consumer Council for Water - Delving into water (2015); Consumer Council for Water - Water & wastewater resilience report (2020); Consumer Council for Water - company performance data appendices (2021); DiscoverWater (2022)

## Assessment of progress

Plans are now in place to deliver most of the reduction in demand and increase in supply that the Commission recommended. Plans on supply add up to delivering more than the Commission's target of 1,300 megalitres a day by 2050. Although taken as a whole water company draft Water Resource Management Plans do not currently add up to an industry wide 50 per cent reduction in leakage, Ofwat has set out a clear mechanism for holding companies to this target in their business plans for Price Review 24.<sup>176</sup> Ofwat has also introduced a £100 million fund to support companies to find new ways to reduce water demand to help meet the demand reduction target.<sup>177</sup> However, more is needed from companies and government to reduce personal water consumption. This year companies should provide more detail in final Water Resource Management Plans on how they plan to achieve stated ambitions on demand reduction. To support this, government must finalise its proposals on mandatory water efficiency labelling, including minimum product standards and providing timelines for proposed action on water efficiency in newbuilds and existing buildings.<sup>178</sup>

- **Long term perspective: Met.** The government's commitment to ensuring resilience against extreme drought by 2050 has driven long term planning by regulators and industry. In line with the Commission's recommendations, the water industry has committed to halving leakage by 2050, and Ofwat and the industry is acting to expand supply. The draft Water Resource Management Plans acknowledge the challenge, and the regional plans are a first step to coordinated long term solutions.
- **Clear goals and concrete plans to achieve them: Partly met.** The government has set clear ambition on demand and leakage reduction, Ofwat acted to speed up the development of supply options, and companies mostly aim to achieve these targets in their draft Water Resource Management Plans. However, water company plans cannot just be aspirations, and action on demand reduction requires detail on how targets will be achieved. Long term, action on demand also depends on government policy. Company plans may struggle to achieve the 110 litres per person per day target without further government intervention at the national level.<sup>179</sup> Though ambitious supply options are being proposed, in most cases it is not yet clear how long they will take to obtain planning approval and be constructed.
- **Firm funding commitment: Partly met.** Ofwat has funded the development of new supply infrastructure and RAPID is working to accelerate infrastructure delivery. This should increase the number of supply schemes being 'construction ready' in time for the next price review. Additionally, in its Price Review 24 methodology, Ofwat have made £100 million available to support companies in helping their customers to use water more efficiently.<sup>180</sup> Evidence of a firm funding commitment will be subject to the funding of new supply schemes in the final Price Review 24 settlement.
- **Genuine commitment to change: Partly met.** The government has set a clear ambition in its Environment Act targets for leakage and demand reduction, and the RAPID programme is showing encouraging signs of delivering new supply options to help meet the drought resilience target. This needs to be backed up by government designating a water resources National Policy Statement to enable planning consent for new projects. It also remains unclear whether company plans and government policies will enable demand reduction.
- **Delivery on the ground: Partly met.** Good progress has been made on leakage, and if this is sustained the industry will meet the Commission's target of halving leakage from 2017-18 levels by 2050. Similarly, draft Water Resource Management Plans demonstrate encouraging ambition on supply and are broadly in line with Commission recommendations. First steps have been taken on delivery, with the Havant Thicket reservoir, the first in the UK for 30 years, securing planning permission and beginning preparation works. However, consumption per person has returned to pre pandemic levels, and has remained broadly stable over the past five years.<sup>181</sup>

# Waste

**Government must do more to increase waste recycling rates. Despite having clear overall targets, recycling rates have stagnated since the mid 2010s. Unless action is taken now, the sector will remain carbon intensive and climate targets may be missed.**

Lower cost, lower carbon disposal options exist for many types of waste, such as food and plastics. The Commission identified this in the first Assessment and recommended ambitious targets to increase recycling of local authority collected waste and plastics, and to reduce emissions from food waste.

The Resources and Waste Strategy and the Environment Act 2021 indicated an ambition to incinerate less and recycle more. But key consultation responses have been delayed and delivery dates pushed back. Government also committed to reduce emissions from food waste, and allocated funding for separate food waste collection and diversion to anaerobic digestion for biogas production. But unless clear rollout plans are now put in place, the 2025 target for universal collections will be at risk. Years of stagnation mean a step change is now required to meet the government's own targets on recycling and separate food waste collection. Focus must shift from strategy to delivery.

## **Actions for 2023**

- Initiate a step change in recycling rates, including for food waste, by proceeding with the Consistency of Waste Proposals, and finalising the Extended Producer Responsibility and Deposit Return Scheme.

## **The waste sector**

The performance of the waste sector has remained stable. Recycling rates for local authority collected waste are around 42 per cent, with England continuing to lag the best international performers in recycling.<sup>182</sup> Over the last decade, incineration with energy recovery has become the dominant mode of waste treatment in England, replacing landfill. Households paid around £165 a year for waste management in 2020-21, an increase of around ten per cent on the previous year.<sup>183</sup> Measures of customer service satisfaction have remained consistently high over the past decade.

Greenhouse gas emissions from waste have increased since the mid 2010s, if the emissions from energy from waste plants are accounted for. Emissions from waste peaked in 1996 and then decreased steadily as biological waste was diverted from landfill, reducing methane emissions. Since the mid 2010s, emissions have increased as waste arisings grew, use of energy from waste plants increased and recycling rates stagnated.

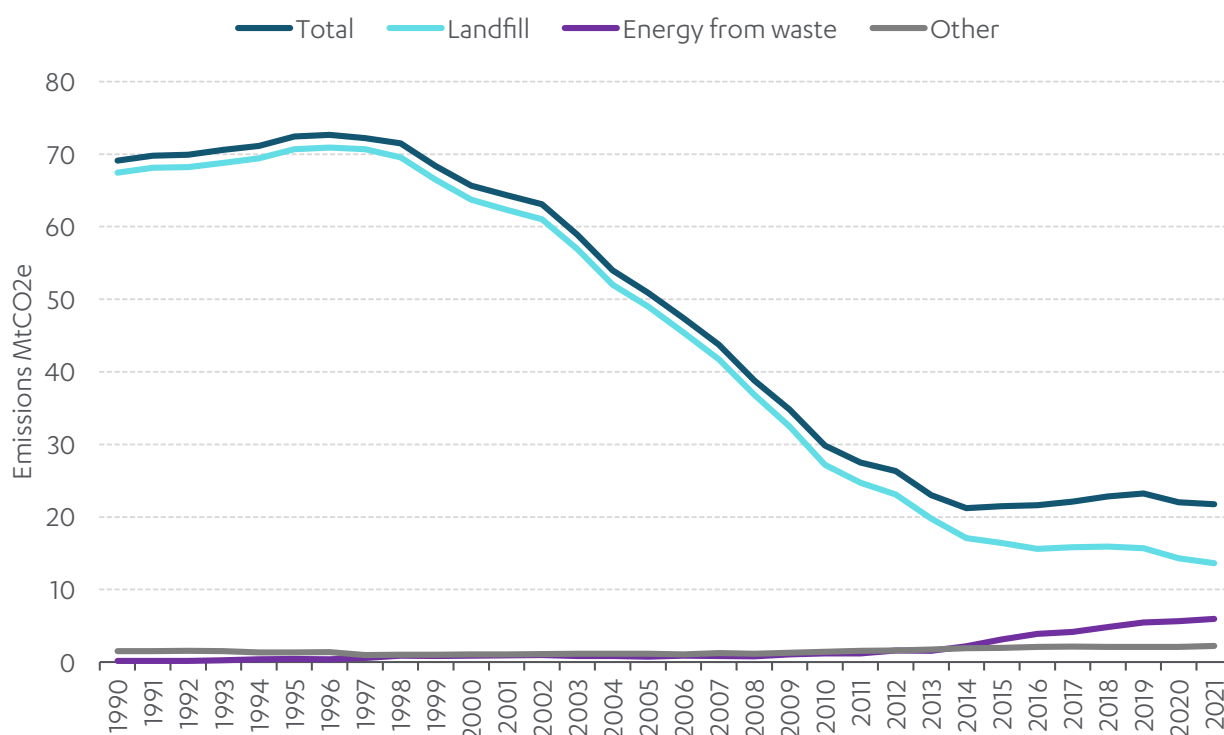


Emissions from energy from waste plants have been displacing emissions from natural gas and coal plants in the power sector and have therefore not led to an overall increase in emissions. However, to meet the government's aim of decarbonizing the power sector by 2035, emissions from energy from waste plants will now need to be eliminated.

The Commission has set out a more detailed overview of the waste sector in Second National Infrastructure Assessment: Baseline Report Annex: E Waste and the Commission's data on the performance of the sector is available online.

**Figure 19: Waste emissions have decreased since 1990 due to less waste being sent to landfill, but have increased since 2014 due to increases in energy from waste**

*Emissions from waste, 1990 – 2021, United Kingdom*



Source: Department for Business, Energy and Industrial Strategy - Final UK greenhouse gas emissions (2021)

## Progress against the Commission's recommendations

### Commission recommendations

In the first Assessment the Commission recommended government should set a target for recycling 65 per cent of local authority collected waste and 75 per cent of plastic packaging by 2030.<sup>184</sup> The Commission also recommended that government should set individual targets for all local authorities and provide financial support for transitional costs.

To enable these changes, the Commission further recommended:

- clear two symbol labelling (recyclable or not recyclable) across the UK by 2022
- a consistent national standard of recycling for households and businesses by 2025
- restrictions on the use of hard to recycle plastic packaging (PVC and polystyrene) by 2025
- incentives to reduce packaging and for product design that is more easily recyclable by 2022
- a common data reporting framework for businesses handling commercial and industrial waste by the end of 2019, ideally through voluntary reporting but, if necessary, by legislation.

The Commission also recommended that government should establish separate food waste collection for households and businesses (to enable production of biogas through anaerobic digestion) by 2025.

## Government policy

The government's key driver of waste policy remains the *Resources and Waste Strategy*, published in 2018. This strategy set a target for 65 per cent of municipal waste to be recycled by 2035.<sup>185</sup>

In 2021, The Environment Act came into law. This introduced new powers to meet the waste targets in the Resources and Waste Strategy and deliver the Commission's recommended actions. These are collectively known as the collection and packaging reforms and include proposals to: extend producer responsibility for packaging waste, introduce a deposit return scheme for in England, and introduce a consistent standard for English waste collections:

- In 2022, government confirmed it will implement Extended Producer Responsibility, which aims to improve recycling rates by incentivising the design of easier to recycle packaging. The scheme will be phased in from 2024, one year later than previously planned.<sup>186</sup> The reforms also include the introduction of a single labelling system for recyclability, which producers must adopt from 2026-7, and recycling targets for packaging under scope of extended producer responsibility, including 62 per cent of plastic packaging by 2030.<sup>187</sup>
- In January 2023, government confirmed it will introduce a Deposit Return Scheme for single use drinks containers from 2025.<sup>188</sup>
- Government has yet to publish its response to the Consistency in recycling consultation, which ran in spring 2021. The consultation considered setting a single national standard for what dry recyclables should be collected across England and setting a date for the introduction of weekly separate food waste collections.<sup>189</sup>

The government has also announced a ban on a range of single use plastics, including polystyrene cups and takeaway containers.<sup>190</sup> It did not endorse the Commission's recommendation to set individual targets for each local authority. Instead, it is developing non statutory performance indicators which will allow local authorities to benchmark their performance more accurately than the current weight based recycling target.

In 2022, the government consulted on mandatory digital waste tracking using a single online system. This will include all domestic hazardous and non hazardous waste and exports of non hazardous waste, and will provide greater clarity on how waste is disposed.<sup>191</sup> Government also consulted on a proposed target to reduce residual waste (excluding major mineral wastes) by 50 per cent by 2042, as part of the Environmental Targets Public Consultation.<sup>192</sup> This target came into force in January 2023.<sup>193</sup>

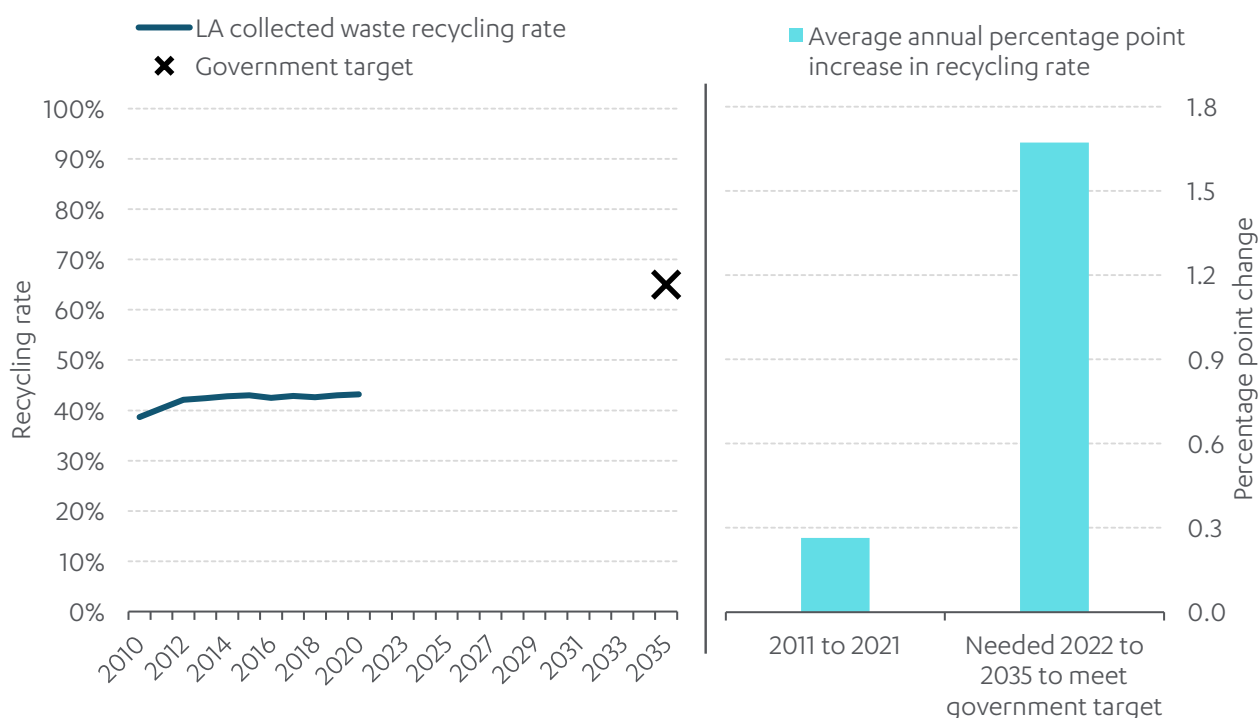
The National Infrastructure Strategy fully endorsed the Commission's recommendation on food waste, and the Environment Act 2021 includes a statutory requirement on local authorities to provide a separate food waste collection to household properties at least once a week. In 2021 the government consulted on proposed target dates for the introduction for these collections across England as part of the consistency in recycling proposals, but it has yet to publish its response.<sup>194</sup>

## Change in infrastructure over the past year

Local authority collected waste recycling rates have plateaued over the last decade at just above 40 per cent. In 2020-21 they dropped from 43 per cent to 42 per cent – this may be due to the impact of the Covid 19 lockdowns on local collections. Plastic packaging recycling rates have also plateaued in recent years, and they fell from 47 per cent in 2020 to 44 per cent in 2021. It is unclear whether this is due to behaviour change caused by the Covid 19 pandemic. The proportion of local authorities collecting food waste separately has increased in recent years to around 43 per cent (figure 22).

**Figure 20: Local authority collected waste recycling rates need to increase rapidly over the next 14 years**

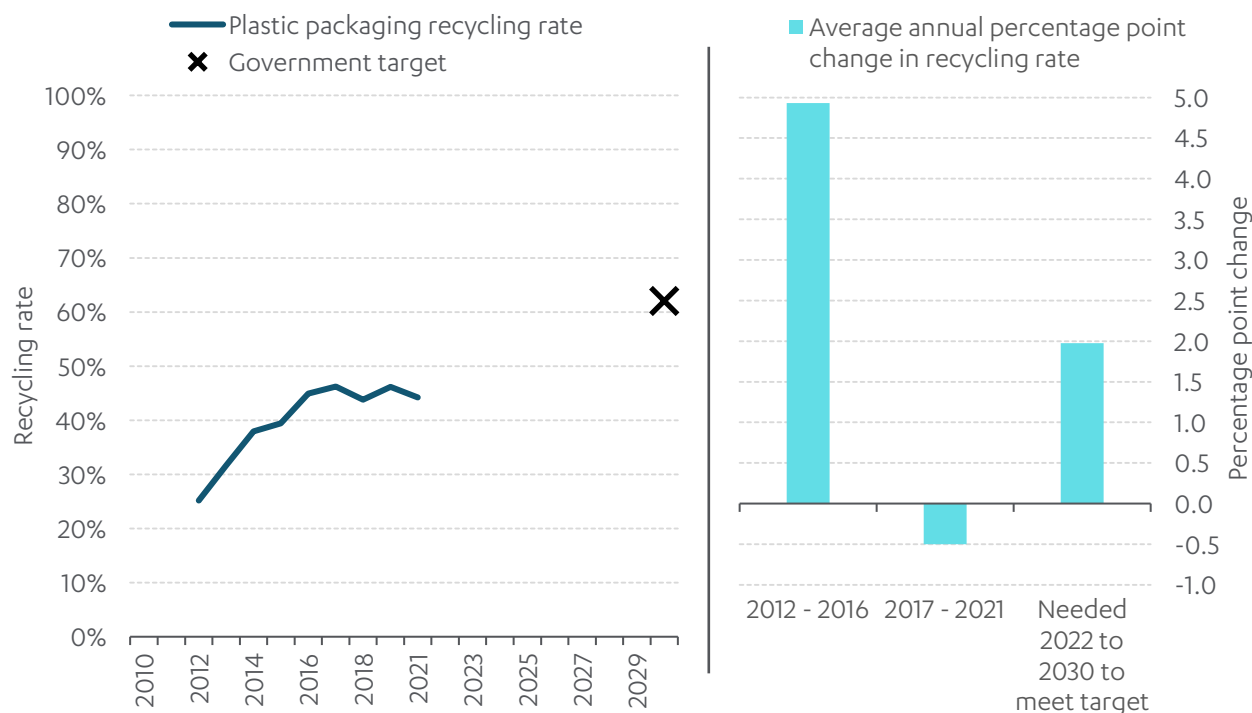
*Historic recycling rates and government target, 2010-11 – 2034-35, England*



Source: DEFRA - ENV18 Local authority collected waste: annual results tables (2022)

**Figure 21: Progress on recycling plastic packaging has stalled and is now well off target**

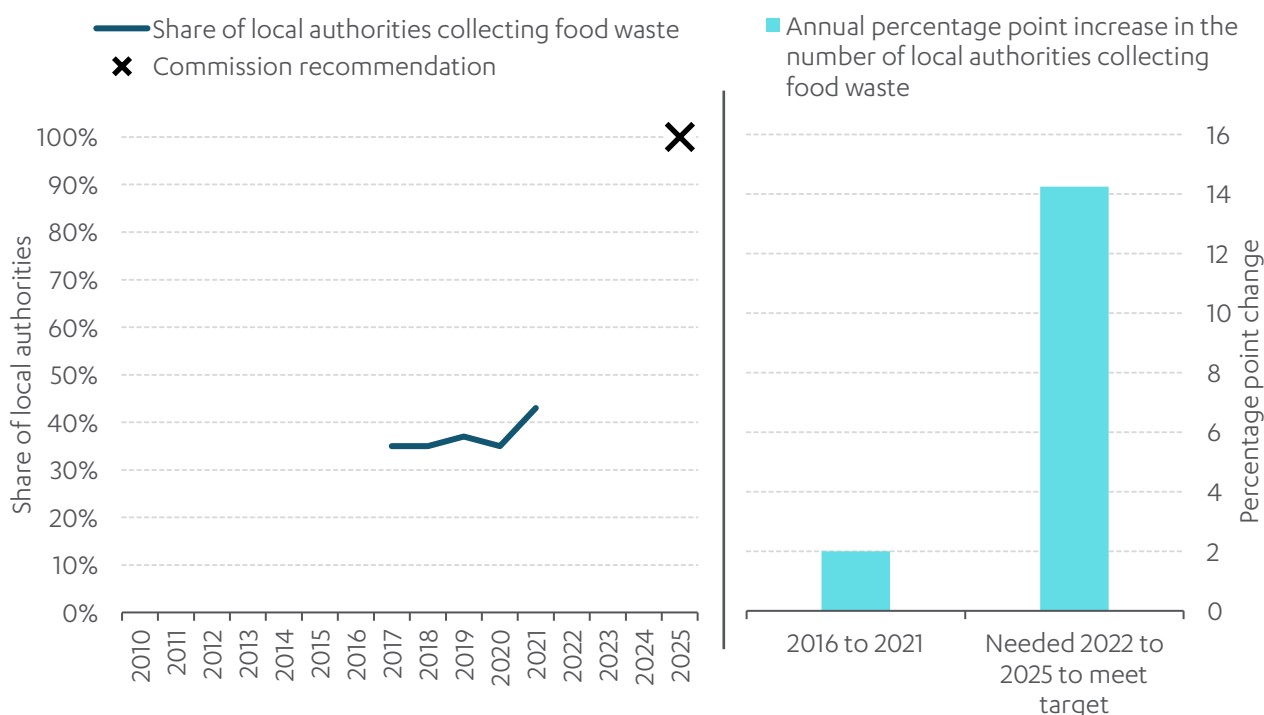
*Plastic packaging recycling rate and government target, 2012 – 2030, United Kingdom*



Source: DEFRA - UK Statistics on Waste (2022)

**Figure 22: Only a third of local authorities have separate food waste collection**

*Share of local authorities collecting separate food waste, 2016 - 2025, England*



Source: Waste and Resources Action Programme - local authority waste data portal

## Assessment of progress

The government has a strategy to improve recycling and recovery of waste in England and the legal powers to progress this. But there have been significant delays to key consultation responses, including consistency in recycling, which hinders progress on both recycling and food waste. Rapid action is now needed from government to address this stagnation in the waste sector otherwise key targets, which are critical for reducing waste sector emissions, will be missed:

- **Long term: Met.** The Environment Act 2021 allows the government to implement further measures to reach the 2035 recycling target, and the government has implemented statutory targets to halve residual waste by 2042.
- **Clear goals and concrete plans to achieve them: Partly met.** The government has set a clear target of recycling 65 per cent of local authority collected waste by 2035. It has also proposed a target to recycle 62 per cent of plastic packaging by 2030 and committed to introduce separate food waste collections for households by 2025. But concrete plans are needed to make these goals a reality and progress on these has been slow.
- **Firm funding commitment: Partly met.** The Spending Review 2021 committed £295 million capital funding for local authorities in England to meet the food waste collection target. However, more detail is needed on how exactly funds will be distributed and startup costs met. The extended producer responsibility will provide funding to improve packaging recycling.
- **Genuine commitment to change: Partly met.** The Resources and Waste Strategy sets a clear vision to reduce waste and improve resource efficiency, underpinned by the powers in the Environment Act 2021. But extensive delays to key consultation responses, particularly on consistency of waste, cast doubt on the strength of the government's commitment to improve recycling rates and recovery from food waste.
- **Delivery on the ground: Not met.** Local authority collected waste recycling rates have plateaued over the last decade and appear well off track for the government's target for 2035 (figure 20). Despite positive progress in the early 2000s, the increase in plastic packaging recycling rates has also slowed, and the government is not on track to meet its own proposed target to recycling 62 per cent of plastic packaging by 2030. However, the number of local authorities collecting food waste separately has increased in recent years (figure 22).

# Cross cutting

## Regulation

### Background

Regulation can deliver the long term strategic investment needed to reach the twin challenges of net zero and adapt to the impacts of climate change. Since privatisation, the regulatory system has attracted significant private sector investment and improved outcomes overall for the public. However, the system was designed for different times, and changes need to be made so that it is fit for the future.

Regulation has a role to play in maintaining public trust in infrastructure services. Investment in infrastructure needs to be funded by either consumers (via bills), or taxpayers. Facilitating investment will be critical to reaching a net zero economy; estimates from the Climate Change Committee suggest up to £50 billion of investment will be needed each year for the next 25 years.<sup>195</sup> Effective regulation must clearly assess how the infrastructure investment flows through to consumers' bills. These issues are especially important due to the ongoing cost of living crisis.

### Commission recommendations

Regulators need to be empowered by government to approve the long term, high quality, strategic investment needed to meet the twin challenges of reaching net zero and adapting to climate change. Decisions also must be made about how these costs are passed on to consumers and/or taxpayers.

In its study, *Strategic Investment and Public Confidence*, the Commission recommended that government:

- set strategic direction to enable long term investment; including regular strategic policy statements setting out a vision for each sector and a coherent set of duties for each regulator, covering price, quality, resilience, and environment/net zero.
- decouple crucial decisions on significant infrastructure investments from the price review process and enhance the use of competition for delivery of new infrastructure in water and energy networks. The Commission advised that government should facilitate this by changing legislation where appropriate and necessary.

The Commission recommended that regulators should be more proactive in addressing financial risk and corporate governance, to ensure that rewards reflect performance and risks genuinely taken by investors. The Commission also recommended that the UK Regulators Network should have a stronger role in facilitating collaboration between regulators.

## Government policy

Government has made some progress on providing strategic direction to regulators. Government updated its strategic policy statement for Ofwat in February 2022 and had previously published strategic direction to Ofcom in 2019. However, there is still no strategic policy statement for Ofgem, with powers provided in the Energy Act 2013 and a consultation on a draft strategic policy statement from 2014 yet to be acted upon.<sup>196</sup> Government had committed to consulting on it in 2022, but this did not happen.<sup>197</sup> This has further implications given the timing of the latest price control decisions, that have the capacity to lock in changes for years ahead.

In 2022 government published a policy paper focused on updating the framework for economic infrastructure regulation.<sup>198</sup> Government committed to launching a review that would consider the Commission's recommendations to review regulators' duties, explore the role of increased competition (building on recent work of the regulators and government), and provide further strategic guidance to regulators. A consultation on economic regulation that would set out more detail on a package of measures was planned for 2022,<sup>199</sup> but is now planned for later this year. Government also commissioned a review of regulator duties in 2022, which concluded over Summer, but no follow up action has been taken.

There has likewise been some progress on increasing competition. Ofgem has moved forward with actions on early competition in onshore electricity transmission, with government planning supporting legislation in the Energy Security Bill.<sup>200</sup> Ofwat has also been moving forward with increasing competition with the development of its "Direct Procurement for Customers" approach which it confirmed in the Price Review 24 methodology will be the default approach for new large infrastructure projects above £200 million whole life total expenditure.<sup>201</sup> Following a request from the government, Ofwat published a stock take identifying barriers and opportunities to unlock more competition, which included recommendations on legislative and planning changes that government should take.<sup>202</sup>

Regulators have since worked together, through the UK Regulators Network, to consult on methodology to harmonise the cost of capital set through different price controls.<sup>203</sup>

### Box 3: legislation to facilitate competition

At Ofwat's request, the then Department for Business, Energy and Industrial Strategy made an exclusion order under the Housing Grants, Construction and Regeneration Act 1996. The order removed the contract requirements of the 1996 Act for Direct Procurement for Customers' projects. This enabled a more efficient and streamlined process for the Haweswater Aqueduct Resilience Programme, a programme to replace all six tunnel sections along the length of the aqueduct that runs from Cumbria to Greater Manchester.

## Assessment of progress

With rising consumer bills and a challenging investment environment, effective regulation is more important than ever. It has now been over three years since the Commission's regulation study Strategic Investment and Public Confidence was published. Whilst some positive steps have been taken, final decisions have yet to be made on the Commission's key recommendations. Clear commitment and rapid action from government is now required to make changes needed to deliver a regulatory system fit for the future.

- **Long term perspective: Not met.** Government guidance on strategic direction has been lacking, and the timing of the latest price control decisions will exacerbate the impact of not acting quickly. Government must deliver on its latest commitment to consult on a strategic policy statement for Ofgem this year – to deliver stability for investors, value for money to consumers, and the means to deliver against long term challenges. Cross sectoral guidance in the form of an open letter (published in January 2022), is not a substitute for sectoral strategic policy statements that regulators must have regard to.
- **Clear goals and concrete plans to achieve them: Not met.** Government has not yet reached final decisions on the key recommendations made by the Commission's study, published in 2019. The policy paper published in January 2022 set out a process of further reviews and consultations, which have since been delayed.
- **Firm funding commitment: Not applicable.** The Commission did not make recommendations on the funding of regulators.
- **Genuine commitment to change: Not met.** Government's policy paper shows that it understands the challenges regulation faces and the need for change. However, its actions on updating the regulatory system — including in updating duties and providing strategic direction — have not yet matched the challenge. The cost of living crisis creates an urgent need for government to deliver.
- **Delivery on the ground: Not applicable.** Whilst regulation facilitates investment in infrastructure it does not, by itself, lead to change on the ground. Regulation can be an enabler for change, such as the financing of new or complex technologies through incentive structures.

## Resilience

### Background

Resilience is a core characteristic of good infrastructure, required to ensure that systems provide the services society relies on. Infrastructure needs to be able to resist, absorb and recover from short term shocks as well as have the capacity to adapt and transform to longer term chronic stresses, such as climate change. While designing in resilience from the start may have additional upfront costs, it is cheaper and easier to do in the long run – especially weighed against the costs of significant failures.<sup>204</sup>



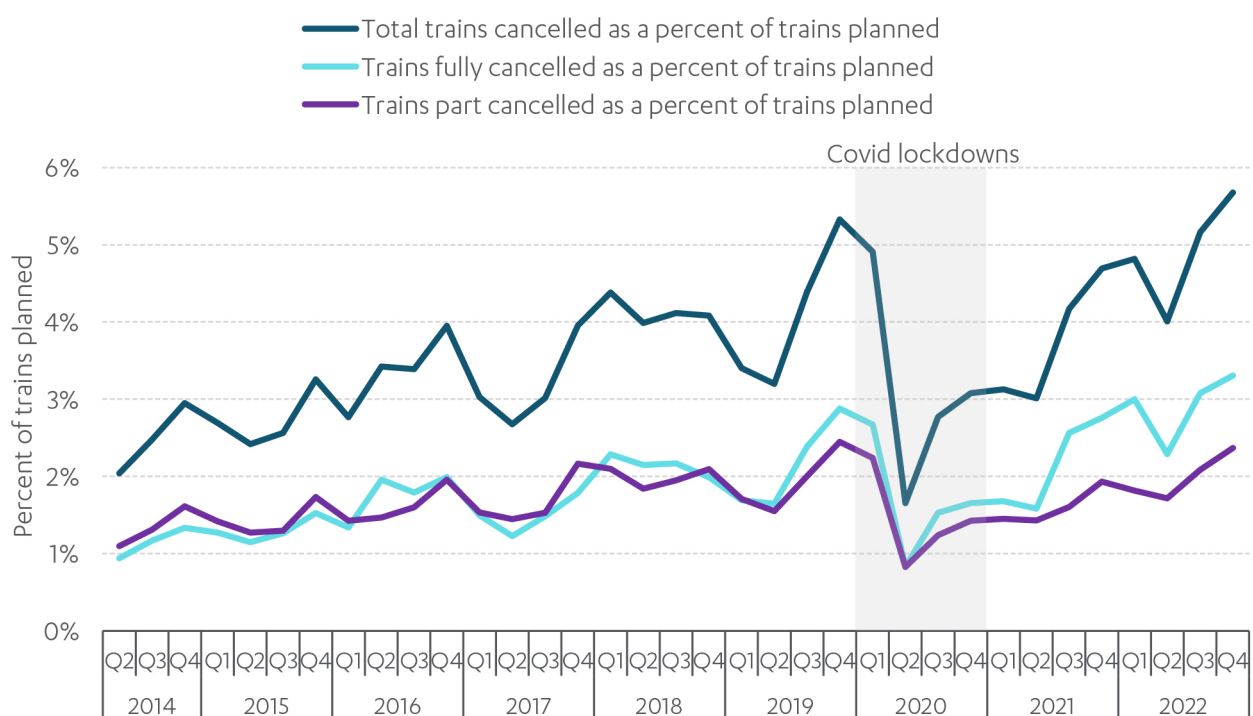
The UK's economic infrastructure has, for the most part, proved fairly resilient over recent decades. Disruptions and failures have generally led to moderate impacts, rather than extreme or catastrophic ones.

However, failures do happen and are becoming increasingly prominent in discussions about the UK's infrastructure. The aftermath of Storm Arwen in November and December 2021 showed the impact of a prolonged loss of service and demonstrated how failures in one infrastructure sector have the potential to cascade to others. The summer 2022 drought has also reinforced the need to ensure water supplies are more resilient to the growing risk from climate change.

In many parts of the country, the service levels on the railway are failing the communities they are there to serve in a clear example of infrastructure services not being resilient enough to foreseeable risks (figure 23). Labour shortages have been a prominent issue, but it is not the only one, with extreme weather events (especially heat) also causing disruption. Train cancellations rose to record levels in 2022 and both punctuality and industry performance measures have been trending downwards since 2020, even though fewer trains are running on the network than were in 2019.<sup>205</sup> Maintaining resilience requires a proactive approach, facing up to the possibility of different or harder challenges in the future.

**Figure 23: Trains cancellations as a proportion of total trains planned has been steadily rising over the past eight years**

*Train cancellations as a percent of planned trains, 2014 – 2022, Great Britain*



Source: Office for Road and Rail – Passenger Rail Performance (2023)

Adapting and building in resilience to a changing climate is a key challenge for the UK's infrastructure, both now and in the future. The pandemic has shown clearly that significant, high impact disruptions can and do happen. There has also been an increased focus on security of supply in the energy sector in recent months, because of Russia's invasion of Ukraine. The Commission will provide advice to government on the net zero transition and climate resilience in the second National Infrastructure Assessment.

## Commission recommendations

The Resilience Study's final report *Anticipate, React Recover: resilient infrastructure systems* included three recommendations, as well as a framework for thinking about resilience:

- government should publish a reviewed and updated set of resilience standards for energy, water, digital, road and rail services, every five years, with regulators ensuring that operators are obliged to meet them
- regulators should require a system of regular stress testing to ensure resilience standards can be met
- energy, water, digital, road and rail infrastructure operators should be required to develop and maintain long term resilience strategies, which can help inform future price controls and investment decisions.

Further details on the resilience recommendations can be found in the full *Anticipate, React, Recover: Resilient infrastructure systems* report.

## Government policy

In December 2022, the UK Government Resilience Framework (the framework) was published,<sup>206</sup> which was the key resilience priority in the Commission's *Infrastructure Progress Review 2022*. The framework sets out government's overarching approach to resilience, both in infrastructure and more broadly, around three key themes:

- developing a better and shared understanding of risks
- emphasising preparation and prevention, rather than cures, wherever possible
- the need to take a 'whole of society' approach.

The framework also provides a concrete commitment to take forward the Commission's recommendation on resilience standards, with new standards to be introduced by 2030. This is a welcome step on from the 'in principle' acceptance in the government's official response to the Resilience Study in September 2021,<sup>207</sup> though further work is still needed to establish how this will be delivered. Appropriate stress testing, which government has accepted the need for in principle, will also need to be considered alongside this to ensure there is confidence that standards will actually be met.

Work is also ongoing on the government's third National Adaptation Programme, which is due to be published in 2023. This will be an important milestone given the government's most recent Climate Change Risk Assessment acknowledged that it needed to "go much further and faster to truly prepare for the impacts of a warmer world."<sup>208</sup>

## Assessment of progress

There has been some welcome progress in the approach to cross cutting resilience issues, not least the long awaited publication of the UK Government Resilience Framework. However, while government's high level ambitions are clearer, further work is needed to develop the actions to deliver this and set out what it means for specific sectors. There are multiple utility price controls due this decade, providing opportunities to ensure the right investments in resilience get made. But these will be missed if action to develop outcome based standards is not taken until 2030, pushing the window of opportunity back to the mid 2030s. The immediate test of how well the framework has been mainstreamed into government thinking will be in how well it aligns with the plans for adaptation policy set out in the National Adaption Programme.

- **A long term perspective: Partly met.** The framework looks beyond the UK's immediate, short term needs and provides clarity on what government wants its approach to look like by 2030. However, there is not the same clarity on longer term resilience outcomes or how resilience should be incorporated into regulatory processes. Greater short term activity is also required to meet the framework's longer term goals.
- **Clear goals and concrete plans to achieve them: Not met.** The framework has provided some broad cross cutting goals for resilience, including expanding resilience standards, but there is not yet an action plan setting out how improved standards and stress testing will be delivered and government's ambition to deliver by 2030 risks missing investment opportunities this decade. There have been some positive sector specific examples – for example, reviews of the impact and handling of Storm Arwen have provided a clear set of actions to assess electricity system standards.<sup>209</sup> However, this still exemplifies a responsive rather than proactive approach to improving resilience and government has not yet set out how it plans to ensure standards are reviewed appropriately regularly.
- **Firm funding commitment: Not met.** There have been some positive signs at sector level, such as resilience featuring in the new Strategic Policy Statement to Ofwat. The inclusion of reopeners in the latest electricity distribution price control to enable a response to Storm Arwen recommendations is also welcome. However, beyond these relatively limited examples, it is not clear what and where government believes additional investment will be required and there is a risk that government's planned milestones for standards will miss price controls this decade. Funding commitments will also be an important test for the National Adaption Programme, as going further and faster on adaptation will require additional resources – the Climate Change Committee recently estimated that up to £10 billion per year extra may be required to improve the UK's preparedness for climate change.<sup>210</sup>
- **Genuine commitment to change: Partly met.** Government has set out a new, more holistic approach to resilience and has repeatedly reiterated its commitment to improving resilience standards. While the proof of this will be in the detail and delivery, the governance changes in Cabinet Office – splitting out long term resilience from emergency response – are a positive sign that government is planning to take

a different approach and attach greater importance to resilience. The new National Adaption Programme will be a key indicator of how strong government's commitment to change is.

- **Delivery on the ground: Not assessed.** Isolating resilience investments is difficult, as such investments often deliver other benefits, such as improved capacity, or form part of business as usual actions, such as maintenance activity. Changes to infrastructure would be expected to follow changes in standards and improved stress testing, but this will depend on how government decides to set them.

## Design

### Background

Design is an essential factor in successful infrastructure projects. It creates infrastructure that looks good and works well for everyone. Without it, costs can spiral, projects may overrun, and assets can fail. That is why it is crucial that good design is embedded in the culture of infrastructure planning and delivery.

The Commission convened the independent National Infrastructure Design Group to champion design excellence in infrastructure and produce the first ever set of design principles. The principles, which were developed in consultation with colleagues across all infrastructure sectors, are:

- **Climate:** seek opportunities during design and construction to enable the decarbonisation of our society and mitigate and offset residual emissions
- **People:** design infrastructure for people, not architects or engineers; make it human scale, easy to navigate and instinctive to use, helping to improve quality of life
- **Places:** provide a strong sense of identity and improve the natural and built environment; make a positive contribution to landscapes within and beyond the project boundary
- **Value:** achieve multiple benefits and solve problems well; add value by defining issues clearly from the outset and providing overall direction for everyone working on the project.

### Commission recommendations

In the *National Infrastructure Assessment* the Commission recommended that design should be embedded in the culture of infrastructure planning by:

- government ensuring that all nationally significant infrastructure projects, including those authorised through hybrid parliamentary bills, have a board level design champion, and use a design panel to maximise the value provided by the infrastructure
- design panels for nationally significant infrastructure projects having regard to the National Infrastructure Commission's design principles.

## Government policy

In the *National Infrastructure Strategy*, published in 2020, government committed to embedding good design in all infrastructure projects. The strategy set out that government would require all infrastructure projects to have a board level design champion in place by the end of 2021, with champions supported by design panels where appropriate. It also committed to embedding the Commission's design principles and recommendations on design champions in the delivery support and assurance regime overseen by the Infrastructure and Projects Authority.

## Assessment of progress

In the *National Infrastructure Strategy*, government demonstrated a commitment to increasing the design quality of the country's infrastructure by setting clear goals and a deadline for embedding the Commission's design recommendations into delivery structures. The Infrastructure and Projects Authority has taken some helpful steps by incorporating, within its delivery support and assurance regime, the requirement for projects to fully consider the Commission's design principles. And there is emerging evidence that on some infrastructure projects, design principles have been used effectively.

However, there has only been limited progress in relation to board level design champions and this is a cause for concern. The National Infrastructure Design Group has worked with the Infrastructure and Projects Authority over the past year to encourage appointment of design champions in line with the government's commitment. But there has been very limited subsequent progress and government has not been sufficiently clear about the steps it now intends to take. The Commission is concerned that unless board appointments are made of sufficient seniority and expertise, it will be extremely difficult to make significant progress in improving the quality of infrastructure design.

## Funding and finance

### Background

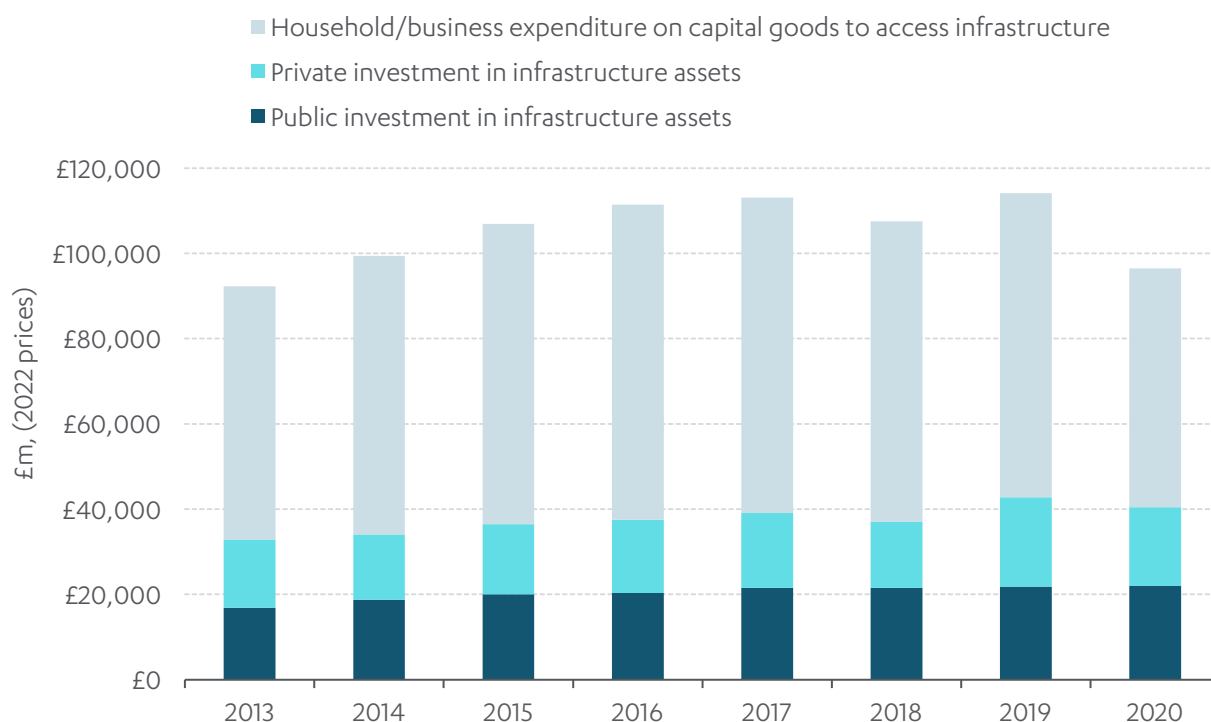
Infrastructure typically requires large upfront investments ('financing') followed by a long period in which these costs, plus ongoing maintenance, and operational costs, are repaid either by taxpayers or users of the infrastructure ('funding').

Around half of the UK's infrastructure assets are financed by the private sector, with the other half coming from public investment (figure 24, page 82). Households and business also expend money on capital goods to use infrastructure, for example buying cars to use roads or phones to use telecommunications networks. Households and business expenditure on capital goods to access infrastructure is much greater than the combined investment from the private and public sectors (figure 24).

Most infrastructure financed through the private sector is funded through consumer bills.<sup>211</sup> Over the past decade, household bills have remained broadly stable at around £7,700 per year (figure 25, page 83). In the last year, bills have increased sharply, in part due to rising energy prices – this is discussed further in the Energy section.

**Figure 24: Public and private sector investment in infrastructure is similar, but households and business spend much more to access infrastructure<sup>212</sup>**

*Public and private sector investment in infrastructure assets and household expenditure on goods to access infrastructure, 2013 to 2020*

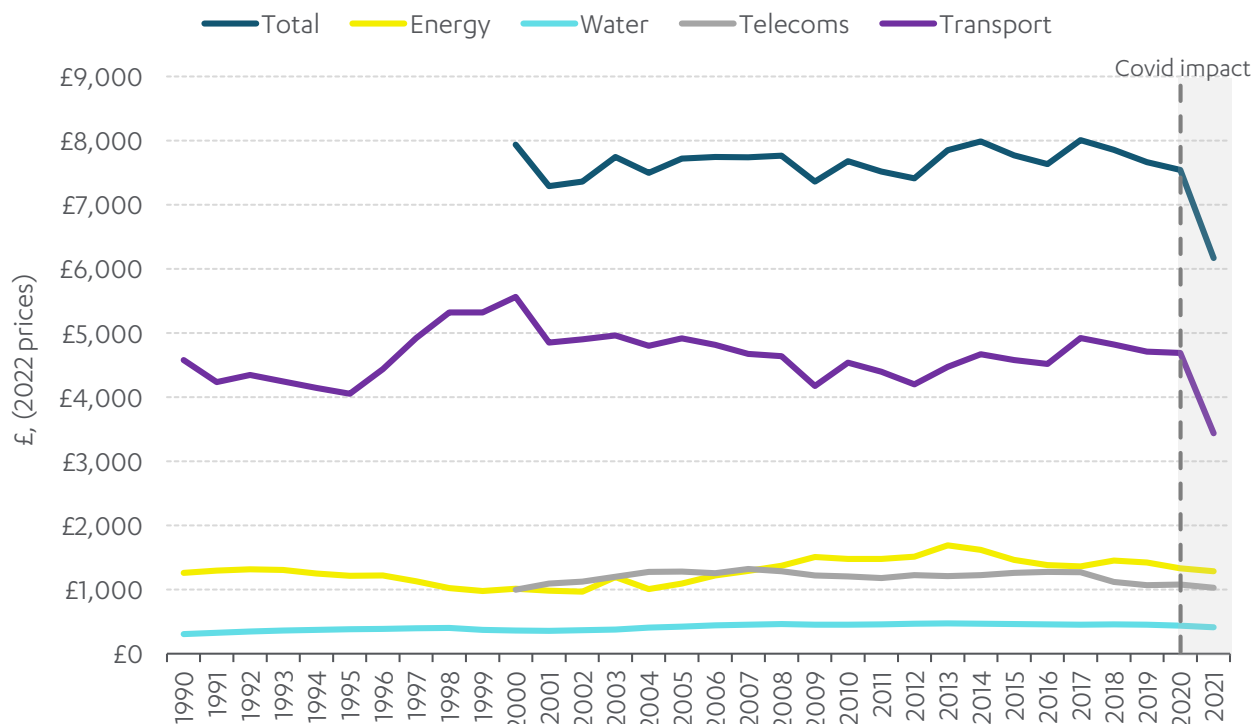


Source: Commission calculations

**Note:** Private investment excludes data for the waste sector, and is considered unreliable pre-2019 as it excludes private capex for the digital sector; household/business expenditure excludes business investment in mobile phones, IT equipment and energy efficiency

**Figure 25: In the two decades before the Ukraine energy price shock, direct costs to UK households of infrastructure remained stable<sup>213</sup>**

*Average annual household expenditure*



Source: Department for Transport, Office for National Statistics, Ofwat, Ofcom

## Commission recommendations

The Commission recommended that government should deliver long term certainty over infrastructure funding and set out its recommended funding profile in the *National Infrastructure Assessment*.

On infrastructure finance, the Commission recommended that government establish a new operationally independent infrastructure finance institution, designed around three key building blocks: sound banking, additionality, and economic and social impact. Its role would be to help address ongoing market failures around innovation in the infrastructure sector and provide additional policy stability. The Commission's recommendations on regulation, as discussed above, are also critical for facilitating private sector capital in economic infrastructure.

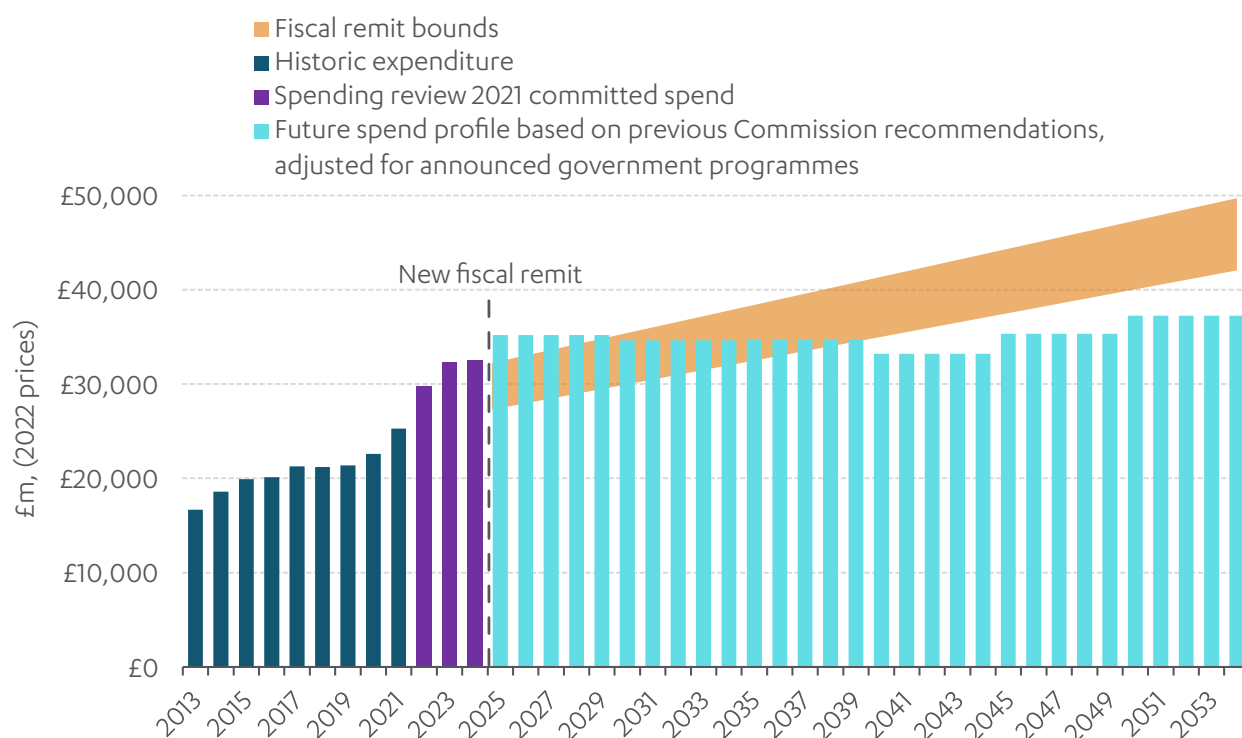
## Government policy

The Spending Review 2021 confirmed a total of £100 billion of investment in economic infrastructure over the next three years, an increase on current levels.<sup>214</sup> Autumn Statement 2022 confirmed that departmental budgets would be maintained at least in line with the commitments from Spending Review 2021.<sup>215</sup> These budgets will face additional pressure due to high levels of construction inflation over the past year.<sup>216</sup>

In addition, government has increased the Commission's fiscal remit from 1 – 1.2 per cent of GDP to 1.1 – 1.3 per cent of GDP, for each year from 2025 to 2055.<sup>217</sup> This is equivalent to just over £3 billion per year additional spending on economic infrastructure on average over the period up to 2055.<sup>218</sup>

**Figure 26: Government is increasing spending on infrastructure in the short term, this must continue in the long term<sup>219</sup>**

*Historic public expenditure on economic infrastructure 2013 to 2021, spending review commitments, Commission recommendations, and the Commission's fiscal remit*



Source: Commission calculations, HMT Public Expenditure Statistical Analyses (2022)

**Note:** Spending review 2021 committed spend of £100 billion is profiled based on department capital budgets set out in Office for Budget Responsibility's March 2023 economic and fiscal outlook. Investment beyond spending review 2021 is based on the investment profile recommended and published by the Commission in the first *National Infrastructure Assessment*, adjusted to 2022 price terms, and adjusted for announced government programmes.

The UK Infrastructure Bank was established in June 2021. The Bank has £12 billion of initial capital to deploy and can issue up to £10 billion of guarantees.<sup>220</sup> It has two strategic objectives: to help tackle climate change and support regional and local economic growth.<sup>221</sup> In June 2022, the UK Infrastructure Bank published its first strategic plan.<sup>222</sup> By March 2023, it has already agreed eleven deals for projects in telecoms, energy, water and transport.<sup>223</sup>



## Assessment of progress

In the Spending Review 2021 the government made a firm funding commitment to economic infrastructure. Whilst the government's commitment does not reflect the exact balance of funding across the fiscal remit recommended in the *National Infrastructure Assessment*, it is broadly aligned with the funding priorities that the Commission set out for the near term. In some areas it goes further than the Commission recommended. If the allocated funded is spent, government funding over the spending review period will be a significant increase on recent years and in line with the Commission's fiscal remit (figure 26). However, over the last two decades government has frequently under delivered on spending commitments; it is critical this time that it follows through.<sup>224</sup>

The government has signalled a longer term commitment to investing in economic infrastructure by increasing the Commission's fiscal remit, the technical guidance on how much public investment the Commission can recommend, to 1.1 – 1.3 per cent of GDP each year from 2025 to 2055 (figure 26).<sup>225</sup> The Commission will make recommendations on how this should be spent in the upcoming second National Infrastructure Assessment.

The establishment of the UK Infrastructure Bank is positive progress and demonstrates government's long term thinking and commitment to change. The UK Infrastructure Bank is already making a positive difference with 11 deals made by March 2023. However, the UK Infrastructure Bank alone is not intended to be the magic bullet for financing UK infrastructure. In addition to the establishment of the UK Infrastructure Bank, clear policy and a stable regulatory environment is needed to mobilise the significant volumes of private financing needed to deliver the Commission's recommendations.

# References

- 1 Calculations based on Office for National Statistics (2022), [National Accounts at a glance](#)
- 2 Resolution Foundation (2022), [Stagnation nation – The Economy 2030 Inquiry](#) and London School of Economics Growth Commission (2017), [UK Growth: A New Chapter](#)
- 3 Institute of Fiscal Studies (2022), [Spatial disparities across labour markets](#)
- 4 The Office for National Statistics (2022), [Productivity in towns and travel to work areas, UK:2019](#)
- 5 Center for Cities (2023), [Capital losses The role of London in the UK’s productivity puzzle](#)
- 6 Resolution Foundation (2022), [Stagnation nation – The Economy 2030 Inquiry](#) and London School of Economics Growth Commission (2017), [UK Growth: A New Chapter](#)
- 7 Resolution Foundation (2022), [Stagnation nation – The Economy 2030 Inquiry](#)
- 8 Chris Skidmore (2023), [Mission Zero: Independent Review of Net Zero](#) and [Net Zero Tracker](#)
- 9 HM Treasury (2022), [Autumn Statement 2022](#)
- 10 Bhuller et al (2023), [The Internet, Search Frictions and Aggregate Unemployment National Bureau of Economic Research Working Paper 30911](#); National Infrastructure Commission (2020), [Growth Across Regions](#)
- 11 National Infrastructure Commission (2020), [Growth across regions](#)
- 12 Climate Change Committee (2020), [The Sixth Carbon Budget](#)
- 13 HM Treasury (2022), [Autumn Statement 2022](#)
- 14 Office for Budget Responsibility (2020), [Capital spending plans: how much will actually be spent?](#)
- 15 The fiscal remit bounds are set based on the latest central projection of long term GDP growth from the OBR. There is a wide range of uncertainty around this central projection, and having both lower and upper thresholds in the fiscal remit is one way to help manage this uncertainty.
- 16 1. Digital currently excludes business investment in mobile phone and IT equipment. Pre-2019 data is considered unreliable; 2. Energy is based on ONS estimates of gross fixed capital formation; 3. Investment in flood infrastructure by the water industry is included in figures for the water sector; 4. Transport excludes aviation and shipping; 5. Waste includes public sector investment only. The spike in 2017 due to transfer between public and private sector as one LA bought itself out of a PFI contract.
- 17 Commission calculations based on Ofwat (2023), [The RAPID gated process and the proposed water resource solutions](#)
- 18 HM Treasury (2023), [Spring Budget 2023](#)
- 19 Jong et al (2021), [A comprehensive approach to understanding urban productivity effects of local governments: local autonomy, government quality and fragmentation, OECD Regional Development Papers, No. 11](#)
- 20 Department for Levelling Up, Housing & Communities (2023), [Nationally Significant Infrastructure: action plan for reforms to the planning process](#)
- 21 Department for Levelling Up, Housing & Communities (2023), [Nationally Significant Infrastructure: action plan for reforms to the planning process](#)
- 22 Commission calculations based on Ofgem (2022), [Decision on Accelerating Onshore Electricity Transmission Investment](#), p.82
- 23 Price rises are estimated to be as much as 17.3 per cent in April. (moneysavingexpert.com). Ofcom announced in February 2023 that it would review inflation-linked telecoms price rises [Ofcom to review inflation-linked telecoms price rises - Ofcom](#)
- 24 Ofcom (2022), [Connected Nations 2022 UK report](#)

- 25 While the increase in fixed network incidents was broadly in line with previous year on year changes, the number of mobile incidents more than doubled to over 700 reports. Winter storms over the past year had a considerable impact on the number and duration of incidences, mainly due to lengthy power outages resulting in communications becoming unavailable in impacted areas. Overall, the majority of outages were caused by hardware failures. Based on Ofcom (2022), [Connected Nations 2022 UK report](#)
- 26 It is also possible to deliver gigabit capable broadband through wireless connectivity, such as through 5G Fixed Wireless Access
- 27 [Product Security and Telecommunications Infrastructure Act 2022 \(legislation.gov.uk\)](#)
- 28 Virgin Media's broadband network is made up if a hybrid fibre-coaxial cable system which uses DOCSIS (Data Over Cable Service Interface Specification) technology to allow high-bandwidth data transfers through cables originally used to deliver TV services. Virgin Media's was able to carry out its gigabit capable upgrade more quickly than full fibre deployment as the improvements to the hybrid network primarily involved upgrading the old DOCSIS 3.0 equipment to the new DOCSIS 3.1 standard. This could be done without the need to change the network cables or to alter the connection into the premises, beside the need for a new router. In contrast, deploying a new full fibre network or upgrading a fibre to the cabinet network to full fibre involves the deployment of new fibre cables, which in general takes longer to carry out and will often have higher deployment costs (i.e. road closures, engineering works, and the need for an engineer to install cable and equipment to individual premises).
- 29 thinkBroadband (2023), [UK Superfast and Fibre Coverage](#)
- 30 Department for Digital, Culture, Media & Sport (2022), [Project Gigabit Delivery Plan – autumn update 2022](#)
- 31 In Scotland 70 per cent of urban premises have gigabit capable coverage, but only 22 per cent of rural premises do; in Wales 53 per cent of premises have gigabit capable coverage, but only 30 per cent of rural premises do; and in Northern Ireland 94 per cent of urban premises have gigabit capable coverage, but only 59 per cent of rural premises do. Department for Digital, Culture, Media & Sport (2022), [Project Gigabit Delivery Plan – autumn update 2022](#)
- 32 Ofcom (2022), [Connected Nations 2022 UK report](#)
- 33 Ofcom (2023), [Full fibre to reach half of homes, as competition drives better broadband](#)
- 34 CityFibre (2022), [CityFibre network passes 2 million homes on its march toward 8 million](#)
- 35 Department for Digital, Culture, Media & Sport (2022), [Project Gigabit Delivery Plan – autumn update 2022](#)
- 36 Department for Digital, Media, Culture & Sport (2021), [Wireless Infrastructure Strategy: call for evidence](#)
- 37 Ofcom (2022), [Connected Nations 2022 UK report](#)
- 38 Ofcom (2022), [Connected Nations 2022 UK report](#)
- 39 Reference to Ofcom work and sentence on commitments in the WIS
- 40 Ofcom (2019), [Connected Nations](#)
- 41 For instance, Network Rail, South Western Trains and Evo Rail have entered a partnership to installing new telecoms infrastructure along 70km of track between Basingstoke and London. In February 2023 it was announced that Network Rail had entered exclusive talks with Neos Networks to upgrade telecoms infrastructure across the rail network as part of Project Reach.
- 42 Ofcom (2022), [Connected Nations 2022 UK report](#)
- 43 Ofcom (2022), [Connected Nations 2022 UK report](#)
- 44 Ofcom (2022), [Connected Nations 2022 UK report](#)
- 45 A non-standalone 5G network is one in which the 5G Radio Access Network is connected to a 4G core network
- 46 A standalone 5G network is one in which the 5G Radio Access Network is connected to a 5G core. A standalone network delivers the full range of 5G functionality.
- 47 Department for Transport (2023), [Domestic transport use by mode: Great Britain, since 1 March 2020](#)
- 48 Explanation of the calculation: Department for Transport (2022), Transport and environment statistics 2022
- 49 Department for Transport (2021), Decarbonising Transport: A Better, Greener Britain

- 50 Department for Transport (2022), [UK electric vehicle infrastructure strategy](#)
- 51 National Infrastructure Commission (2018), [National Infrastructure Assessment](#)
- 52 National Infrastructure Commission (2021), [Infrastructure, Towns and Regeneration](#)
- 53 National Infrastructure Commission (2018), [National Infrastructure Assessment](#)
- 54 HM Treasury (2021), [Autumn Budget and Spending Review 2021: documents](#)
- 55 HM Treasury (2023), [Spring Budget 2023](#)
- 56 Department for Levelling Up, Housing and Communities (2022), [Levelling Up and Regeneration Bill](#)
- 57 UK Government (2022), [Policy papers and consultations](#)
- 58 HM Treasury (2023), [Spring Budget 2023](#)
- 59 HM Treasury (2022), [Government Response to the National Infrastructure Commission report Infrastructure, Towns and Regeneration](#)
- 60 Department for Transport (2022), [Integrated Rail Plan for the North and Midlands](#)
- 61 West Yorkshire Combined Authority (2022), [Mass Transit takes a step forward as statutory consultation gets underway](#)
- 62 Office for National Statistics (2023), [Population living in an area covered by a combined authority or regional governance body that has a devolution deal with a directly elected mayor, England, as of 13 January 2023](#)
- 63 Department for Levelling Up, Housing and Communities (2021), [Oxford-Cambridge Arc](#)
- 64 Department for Transport (2021), [Integrated Rail Plan for the North and Midlands](#)
- 65 Office for National Statistics (2023), [Construction output in Great Britain: December 2022, new orders and Construction Output Price Indices, October to December 2022](#)
- 66 Department for Transport (2022), [High Speed Two 6-monthly report to Parliament: October 2022](#)
- 67 UK Parliament (2023), [Transport Update Statement made on 9 March 2023](#)
- 68 Department for Transport, [Highways England \(2021\), Oxford to Cambridge expressway project cancelled as Transport Secretary looks to alternative plans for improving transport in the region](#)
- 69 Department for Transport (2022), [High Speed Two 6-monthly report to Parliament: October 2022](#)
- 70 Network Rail, [How the East West Rail project will make travel across Britain easier](#)
- 71 Network Rail, [For the first time in over 50 years, Phase 2 will create direct connections between Oxford and Bletchley/Milton Keynes](#)
- 72 Department for Business, Energy & Industrial Strategy (2020), [The ten point plan for a green industrial revolution](#)
- 73 Department for Transport (2022), [UK electric vehicle infrastructure strategy](#)
- 74 Department for Transport (2022), [Zero emission fleets: local authority toolkit](#)
- 75 Ofgem (2021), [Ofgem to ensure electric car revolution unlocks full benefits for consumers](#)
- 76 OZEV (2023), [£56 million of public and industry funding electrifies chargepoint plans across the country](#)
- 77 Department for Business, Energy & Industrial Strategy and Ofgem (2023), [Electric vehicle smart charging action plan](#)
- 78 Department for Transport (2023), [Electric vehicle charging device statistics: January 2023](#)
- 79 National Infrastructure Commission (2019), [Better Delivery: the challenge for freight](#)
- 80 Department for Transport (2021), [Transport Decarbonisation Plan](#)
- 81 Department for Transport (2022), [Future of Freight](#)
- 82 Department for Transport (2022), [£200 million boost to rollout of hundreds more zero-emission HGVs](#)
- 83 Department for Business, Energy and Industrial Strategy (2022), [Digest of UK Energy Statistics: electricity](#)
- 84 Department for Levelling Up, Housing and Communities (2022), [English Housing Survey 2020 to 2021: energy](#)

- 85 Department for Business, Energy and Industrial Strategy (2022), [Provisional UK greenhouse gas emissions national statistics 2021](#). Excludes indirect emissions from electricity consumption.
- 86 Department for Business, Energy and Industrial Strategy (2022), [Digest of UK Energy Statistics: natural gas](#)
- 87 Department for Business, Energy and Industrial Strategy (2022), [Quarterly Energy Prices – September 2022](#)
- 88 Department for Business, Energy and Industrial Strategy (2022), [Quarterly Energy Prices – September 2022](#)
- 89 Commission calculations based on Ofgem (2022), Decision on Accelerating Onshore Electricity Transmission Investment, p.82
- 90 Department for Business, Energy and Industrial Strategy (2022), [Digest of UK Energy Statistics: energy](#)
- 91 Ofgem (2023), [Ofgem announces latest quarterly price cap update](#)
- 92 Ofgem (2022), [Default Tariff Cap](#)
- 93 Department for Business, Energy and Industrial Strategy (2022), [Energy Price Guarantee](#)
- 94 Office for Budget Responsibility (2022), [Economic and fiscal outlook, March 2023](#)
- 95 National Infrastructure Commission (2020), [Renewables, Recovery and Reaching Net Zero](#)
- 96 National Infrastructure Commission (2016), [Smart Power](#)
- 97 National Infrastructure Commission (2019), [Strategic Investment and Public Confidence](#)
- 98 Department for Business, Energy and Industrial Strategy/10 Downing Street (2022), [British Energy Security Strategy](#)
- 99 National Infrastructure Commission analysis
- 100 Department for Levelling Up, Housing and Communities (2022), [Levelling-up and Regeneration Bill: reforms to national planning policy](#)
- 101 Department for Business, Energy and Industrial Strategy (2022), [Facilitating the deployment of large-scale and long-duration energy storage: government response](#)
- 102 Ofgem (2022), [RIIO-ED2 Final Determinations](#)
- 103 Ofgem (2022), [Decision on accelerating onshore electricity transmission investment](#)
- 104 Department for Business, Energy and Industrial Strategy/10 Downing Street (2022), [British Energy Security Strategy](#)
- 105 Department for Business, Energy and Industrial Strategy (2022), [UK government takes major steps forward to secure Britain's energy independence](#)
- 106 Department for Business, Energy and Industrial Strategy (2022), [Energy Trends: UK weather](#)
- 107 Department for Business, Energy and Industrial Strategy (2022), [Contracts for Difference \(CfD\) Allocation Round 4: results](#)
- 108 National Infrastructure Commission (2018), [National Infrastructure Assessment](#)
- 109 The promotion of energy efficiency is devolved in Scotland, Wales and Northern Ireland
- 110 HM Treasury (2022), [Autumn Statement 2022](#)
- 111 HM Treasury (2022), [Autumn Statement 2022](#)
- 112 Department for Business, Energy and Industrial Strategy (2019), [Government Response to BEIS Select Committee Recommendations](#)
- 113 Department for Business, Energy and Industrial Strategy (2022), [Final Stage Impact Assessment ECO4](#)
- 114 Department for Business, Energy and Industrial Strategy (2022), [ECO+ Consultation Stage Impact Assessment](#)
- 115 Department for Business, Energy and Industrial Strategy/10 Downing Street (2020), [The Ten Point Plan for a Green Industrial Revolution](#)
- 116 Ofgem (2022), [Boiler Upgrade Scheme \(BUS\)](#)
- 117 Department for Business, Energy and Industrial Strategy (2022), [Energy Security Bill factsheet: Enabling the Hydrogen Village trial](#)
- 118 Department for Levelling Up, Housing and Communities (2022), [English Housing Survey 2021-22](#)

- 119 Climate Change Committee (2022), [2022 Progress Report to Parliament](#)
- 120 Department for Levelling Up, Housing and Communities (2022), [English Housing Survey 2021-22](#)
- 121 Climate Change Committee (2022), [2022 Progress Report to Parliament](#)
- 122 The Initial demand for the government's Boiler Upgrade Scheme has also been low, with only 7,000 vouchers issued in the first six months of the scheme
- 123 National Infrastructure Commission (2021), [Engineered greenhouse gas removals](#)
- 124 HM Government (2021), [Net Zero Strategy: Build Back Greener](#)
- 125 Department for Business, Energy and Industrial Strategy (2022), [Carbon capture, usage and storage \(CCUS\): Dispatchable Power Agreement business model](#)
- 126 HM Treasury (2023), [Spring Budget 2023](#)
- 127 Department for Business, Energy and Industrial Strategy (2022), [Hydrogen Business Model and Net Zero Hydrogen Fund: Electrolytic Allocation Round 2022](#)
- 128 National Infrastructure Commission (2018), [The National Infrastructure Assessment](#)
- 129 Whilst the Environment Agency makes an assessment for areas at very low risk from river and coastal flooding it does not do so for areas at risk of surface water flooding. To enable direct comparison the Commission has focused on those areas at low risk of flooding and above.
- 130 Environment Agency (2022), [Flood and coastal erosion risk management report: 1 April 2019 to 31 March 2020](#)
- 131 National Infrastructure Commission (2022), [Reducing the risk of surface water flooding](#)
- 132 Environment Agency (2022), [Flood and coastal erosion risk management report: 1 April 2019 to 31 March 2020](#)
- 133 Environment Agency (2020), [National Flood and Coastal Erosion Risk Management Strategy for England](#)
- 134 Department for Environment Food and Rural Affairs (2022), [Flood and Coastal Erosion Risk Management: assessment of benefit of the 2015 to 2021 capital investment programme](#)
- 135 National Audit Office (2020), [Managing flood risk](#)
- 136 National Infrastructure Commission (2018), [The National Infrastructure Assessment](#)
- 137 National Infrastructure Commission (2018), [The National Infrastructure Assessment](#)
- 138 National Infrastructure Commission (2022), [Reducing the risk of surface water flooding](#)
- 139 National Infrastructure Commission (2022), [Reducing the risk of surface water flooding](#)
- 140 Department for Environment Food & Rural Affairs (2023), [The review for implementation of Schedule 3 to The Flood and Waste Management Act 2012](#)
- 141 HM Government (2020), [Flood and coastal erosion risk management](#)
- 142 HM Government (2020), [Flood and coastal erosion risk management](#)
- 143 Environment Agency (2022), [Measuring resilience to flooding and coastal change](#)
- 144 Department for Environment Food & Rural Affairs (2021), [Flood and coastal erosion risk management](#)
- 145 Environment Agency and Department for Environment Food and Rural Affairs (2022), [Flood and coastal resilience innovation fund](#)
- 146 Department for Environment Flood & Rural Affairs (2022), [Repeatedly flooded communities to receive dedicated funding](#)
- 147 Department for Levelling Up, Housing and Communities (2022), [Flood risk and coastal change](#)
- 148 <https://www.gov.uk/government/publications/flood-and-coastal-erosion-risk-management-strategy-roadmap-to-2026>
- 149 Environment Agency (2022), [National Flood and Coastal Erosion Risk Management Strategy for England](#)
- 150 Environment Agency (2022), [National overview \(part a\)](#)
- 151 Water UK (2022), [Have your say on the future of drainage, wastewater and environmental water quality in your area](#)



- 152 Environment Agency (2021), [Flood and coastal risk management: long-term investment scenarios](#)
- 153 Department for Environment Food & Rural Affairs, [More than 1,000 flood schemes to benefit from record investment](#)
- 154 Environment Agency (2022), [Annual report and accounts for the financial year 2021 to 2022](#)
- 155 Water UK (2022), [Water bills forecast to see below-inflation increase of 1.7 per cent with a range of support available for those struggling to pay](#); Water UK (2023), [Water bills to rise by less than inflation](#)
- 156 Drinking Water Inspectorate (2022), [Drinking Water 2021](#), p.11
- 157 Commission analysis based on Consumer Council for Water (2017), [Data Appendices – Water Resilience and Discover Water](#) (2022), [Loss of supply](#)
- 158 National Infrastructure Commission (2018), [National Infrastructure Assessment](#)
- 159 National Infrastructure Commission (2018), [National Infrastructure Assessment](#)
- 160 National Infrastructure Commission (2018), [National Infrastructure Assessment](#)
- 161 House of Commons Environmental Audit Committee (2022), [Water Quality in Rivers](#), p.7 and Environment Agency (2022), [Water and Sewerage Companies in England: Environmental performance report 2021](#)
- 162 Department for Environment, Food and Rural Affairs (2022), [Storm Overflows Discharge Reduction Plan](#), p.8
- 163 National Infrastructure Commission (2018), [National Infrastructure Assessment](#)
- 164 National Infrastructure Commission (2018), [National Infrastructure Assessment](#)
- 165 HM Treasury (2020), [National Infrastructure Strategy](#)
- 166 Defra (2022), [Government’s Strategic Priorities for Ofwat](#)
- 167 Ofwat (2019), [PR19 Final Determinations: Overview of companies’ final determinations](#)
- 168 Water UK (2018), [Letter to the Secretary of State](#)
- 169 Water Resources South East (2022), [Future Proofing Our Water Supplies: A Consultation on our Draft Regional Plan for South East England](#), p.30
- 170 Department for Environment Food & Rural Affairs (2022), [Consultation on environmental targets](#)
- 171 Defra (2022), [UK Mandatory Water Efficiency Labelling](#)
- 172 Ofwat (2019), [PR19 Final Determinations: Policy Summary](#)
- 173 Ofwat (2019), [A RAPID response to boost water resources resilience](#)
- 174 The National Framework for Water Resources (2022), [Summary of Regional Plans for Water Resources](#)
- 175 Ofwat (2022), [Leakage in the water industry](#)
- 176 Ofwat (2022), [Creating Tomorrow, Together : Our Final Methodology for PR24](#), pp.87-8. Water Resources East have not committed to a 50 per cent reduction in leakage: Water Resources East (2022), [Draft Regional Plan for Water Resources](#), p.40.
- 177 Ofwat (2022), [Creating Tomorrow Together: our final methodology for PR24](#), p.19
- 178 Water Resources East (2022), [Draft Regional Water Resources Plan for Eastern England](#), p.39 and [Affinity Water \(2022\), Draft Water Resources Management Plan 2024](#), p.158
- 179 For example see Thames Water (2022), [Draft Water Resources Management Plan 2024: Section 8 – Demand Options](#), pp.66-7, Affinity Water (2022), [Draft Water Resources Management Plan 2024](#), p.158, United Utilities (2022), [Draft Water Resource Management Plan](#), p.67
- 180 Ofwat (2022), [Creating Tomorrow, Together : Our Final Methodology for PR24](#), p.19
- 181 National Infrastructure Commission (2022), [Getting Cities Moving: adaptive transport solutions for an uncertain future](#), p.10
- 182 National Infrastructure Commission (2021) [Baseline Report Annex E: Waste](#), p. 10
- 183 Department for Levelling Up, Housing and Communities (2022), [Local authority revenue expenditure and financing, Individual Local Authority Outturn R05](#)

- 184 The Commission's original recommendation referred to 65 per cent of municipal waste. Municipal waste was historically used to refer to waste collected by local authorities by the UK government. However, a different definition of municipal waste is given in the Landfill Directive. To avoid ambiguity a new term was introduced: local authority collected waste. Local authority collected waste refers to all waste collected by the local authority, including household and business waste and other waste streams such as construction and demolition waste. Given its similarity to the original definition of municipal waste, local authority collected waste is now used in place of municipal waste in government statistical publications. In line with this, the Commission will now refer to its recommendation as 65 per cent of local authority collected waste, and monitor progress against this. More detail is available on definitions at Department for the Environment Food & Rural Affairs (2011), [Local authority collected waste – definition of terms](#).
- 185 Resource and waste strategy and this [Waste \(Circular Economy\) \(Amendment\) Regulations 2020](#)
- 186 Department for Environment Food & Rural Affairs (2022), [Extended Producer Responsibility for Packaging](#)
- 187 Department for Environment Food & Rural Affairs (2022), [Extended Producer Responsibility for Packaging](#)
- 188 Department for Environment Food & Rural Affairs (2021), [Deposit Return Scheme for drinks containers moves a step closer](#)
- 189 Department for Environment Food & Rural Affairs (2021), [Consistency in Household and Business Recycling in England](#)
- 190 Department for Environment Food & Rural Affairs (2023), [Far-reaching ban on single-use plastics in England](#)
- 191 Department for Environment Food & Rural Affairs (2022), [Mandatory digital waste tracking](#)
- 192 Department for Environment Food & Rural Affairs (2022), [Consultation environmental targets](#)
- 193 [The Environmental Targets \(Residual Waste\) \(England\) Regulations 2022](#)
- 194 Department for Environment Food & Rural Affairs (2021), [Consistency in Household and Business Recycling in England](#)
- 195 Climate Change Committee (2020), [The Sixth Carbon Budget](#)
- 196 Department for Business, Energy & Industrial Strategy (2015), [Closed consultation Strategy and policy statement](#)
- 197 Department for Business, Energy & Industrial Strategy (2020), [Energy White Paper](#) p.90; Department for Business, Energy & Industrial Strategy (2022), [Economic Regulation Policy](#) p.13
- 198 Department for Business, Energy & Industrial Strategy (2022), [Economic Regulation Policy](#)
- 199 Department for Business, Energy & Industrial Strategy (2022), [Economic Regulation Policy](#) p.9
- 200 Ofgem (2022), [Decision on early competition in onshore electricity transmission networks](#); Department for Business, Energy & Industrial Strategy (2022), [Energy Security Bill factsheet: Competition in onshore electricity networks](#)
- 201 Ofwat (2022), [Creating tomorrow, together: Our final methodology for PR24 Appendix 5 Direct procurement for customers](#) p.4
- 202 Department for Business, Energy & Industrial Strategy (2022), [Strategic priorities and cross-sectoral opportunities for the utilities sectors: open letter to regulators](#); Ofwat (2022), [Competition Stocktake Report](#)
- 203 UK Regulators Network (2022), [UKRN guidance for regulators on the methodology for setting the cost of capital – consultation](#)
- 204 National Infrastructure Commission (2020), [Anticipate, React, Recover: resilient infrastructure systems](#)



- 205 Office of Rail and Road (2022), [Passenger rail performance: 1 July to 30 September 2022](#). This data does not reflect the full impact of disruption. It does not include trains cancelled before 10pm the previous evening and so does not reflect changes made in advance of industrial action. The rail regulator is seeking to amend how these cancellations are recorded so that data better reflects the passenger experience. Office of Rail and Road (2022), [Regulator tells rail industry to ensure cancellation statistics match the passenger experience](#)
- 206 HM Government (2022), [The UK Government Resilience Framework](#)
- 207 HM Government (2021), [Government Response to the National Infrastructure Commission report 'Anticipate, React, Recover: Resilient Infrastructure Systems'](#)
- 208 HM Government (2022), [UK Climate Change Risk Assessment 2022](#)
- 209 Energy Emergencies Executive Committee (2022), [Storm Arwen Review: Final Report](#) and Ofgem (2022), [Final report on the review into the networks' response to Storm Arwen](#)
- 210 Climate Change Committee (2023), [Investment for a well-adapted UK](#)
- 211 National Infrastructure Commission (2018), [National Infrastructure Assessment](#)
- 212 1. Digital currently excludes business investment in mobile phone and IT equipment. Pre-2019 data is considered unreliable; 2. Energy is based on ONS estimates of gross fixed capital formation; 3. Investment in flood infrastructure by the water industry is included in figures for the water sector; 4. Transport excludes aviation and shipping; 5. Waste includes public sector investment only. The spike in 2017 is due to transfer between public and private sector as one LA bought itself out of a PFI contract
- 213 Note: Prices deflated using Office for National Statistics CPIH
- 214 HM Treasury (2021), [Autumn Budget And Spending Review 2021](#)
- 215 HM Treasury (2022), [Autumn Statement 2022](#)
- 216 Office for National Statistics (2023), [Construction output in Great Britain: December 2022, new orders and Construction Output Price Indices, October to December 2022](#)
- 217 HM Treasury (2021), [Autumn Budget And Spending Review 2021](#)
- 218 £3 billion per year calculated as 0.1 per cent of GDP between 2025 to 2055, GDP forecast from: HM Treasury (2022), GDP deflators at market prices, and money GDP December 2021 (Quarterly National Accounts)
- 219 The fiscal remit bounds are set based on the latest central projection of long term GDP growth from the OBR. There is a wide range of uncertainty around this central projection, and having both lower and upper thresholds in the fiscal remit is one way to help manage this uncertainty.
- 220 UK Infrastructure Bank (2022), [Strategic plan](#)
- 221 UK Infrastructure Bank (2022), [Strategic plan](#)
- 222 UK Infrastructure Bank (2022), [Strategic plan](#)
- 223 UK Infrastructure Bank (2023), [News and blogs](#)
- 224 Office for Budget Responsibility (2020), [Capital spending plans: how much will actually be spent?](#)
- 225 HM Treasury (2021), [Remit letter to the National Infrastructure Commission](#)

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