



# INFRASTRUCTURE PROGRESS REVIEW 2022

Annual Monitoring Report



**NATIONAL  
INFRASTRUCTURE  
COMMISSION**

Better infrastructure for all

## 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://www.nic.org.uk/about/what-we-do/), which includes a table of devolved administration responsibilities by infrastructure sector.

## The members of the Commission



Sir John Armitt  
(Chair)



Professor Sir Tim  
Besley CBE



Neale Coleman CBE



Professor David  
Fisk CB



Andy Green CBE



Professor Sadie  
Morgan OBE



Julia Prescott



Bridget Rosewell CBE

Full Commissioner biographies can be found on our website at [nic.org.uk/about/the-commission/](https://www.nic.org.uk/about/the-commission/)

# Contents

---

Foreword	3
Executive summary	4
Digital	13
Energy	21
Flood resilience	30
Water	34
Waste	39
Transport	45
Cross cutting issues	55
Endnotes	64

---

# Foreword

---

In last year's review we applauded government for publishing the UK's first *National Infrastructure Strategy*, informed by the Commission's own recommendations - and particularly for doing so in the midst of the Covid-19 pandemic.



This year, it is right to further recognise the increased investment the government has indicated it will make in national infrastructure. As well as a £100 billion commitment over the next three years, it has also lifted the 'fiscal remit' – the funding envelope within which the Commission must cost our recommendations – to 1.1 to 1.3 per cent of GDP from 2025.

This potentially represents billions of extra pounds in spending on preparing our transport, energy, flood resilience, water, waste and digital networks for the future.

Through the Strategy and related announcements, government has set clear, long term goals for most infrastructure sectors. And there has been some progress, with the establishment of the UK Infrastructure Bank this year and the continuing expansion of gigabit capable broadband and renewable energy generation.

But it is also our role, as independent advisers, to sound a warning when we think progress is insufficient towards the goals to which government has committed, and around which there is almost universal consensus: the need to reduce greenhouse gas emissions, become more resilient to climate change and ensure economic opportunity is spread more evenly across the country.

Reviewing the current state of key areas of policy and delivery, gaps are opening up between aspiration and execution.

We highlight several areas of concern, where urgent action is needed to avoid serious risks to delivering the objectives of the *National Infrastructure Strategy*.

These include the need for a comprehensive energy efficiency push to hit the government's own target for all homes to be rated EPC C or above by 2035.

We also need to devolve five year funding settlements for transport spending to local authorities beyond the current metro mayoralities.

And we need to turbo charge the roll out of electric vehicle charging points, accelerating the installation of both rapid and on-street charging facilities so that the 2030 date for the end of the sale of new petrol and diesel cars remains viable.

At a time of significant global volatility alongside concerns about rising living costs, we appreciate that sticking to a long term strategy is not easy.

But it is the only way to address the stubbornly difficult problems that will not become any easier or cheaper to solve by delaying action – and the quicker we tackle them, the quicker society and our environment will reap the benefits.

**Sir John Armitt, Chair**

# Executive summary

## Clear, long term goals

At Spending Review 2021, government made a firm funding commitment to support economic infrastructure over the next three years. At the same time, it signalled a longer term commitment to investing in economic infrastructure by increasing the Commission’s fiscal remit to 1.1 – 1.3 per cent of GDP each year from 2025 to 2055.

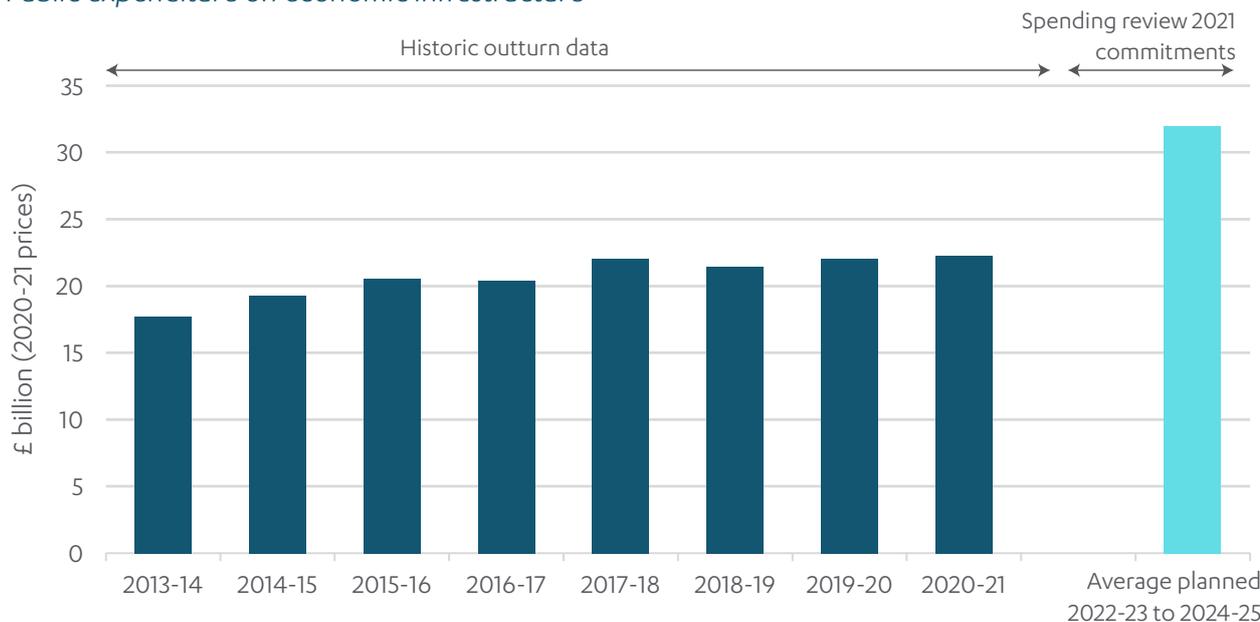
These were positive commitments. Delivering the economic infrastructure the country needs is critical to achieving sustainable economic growth, boosting competitiveness, improving quality of life, supporting climate resilience and transitioning to net zero carbon emissions by 2050. Economic infrastructure will also need to adapt to behaviour changes that may result from the shock caused by the Covid-19 pandemic, such as new working and commuting patterns.

But to ensure this money is spent effectively, government needs its infrastructure strategy to be sound and its policies robust. And in the context of a tight fiscal environment and rising costs of living, each pound spent must return maximum value.

In 2020, government responded to the Commission’s first *National Infrastructure Assessment* by publishing a detailed and comprehensive approach to infrastructure policy in the *National Infrastructure Strategy*. Over the past year it has backed this up with other key strategies, including the *Net Zero Strategy*, the *Levelling Up White Paper*, and the *Environment Act 2021*. The government has now set clear, long term goals in most areas.

### Figure 1: Government has committed to increasing public spending on economic infrastructure

*Public expenditure on economic infrastructure*



Source: Commission calculations, HM Treasury (2021), [Spending Review 2021](#). Note: the profile of the £100 billion spending commitment on economic infrastructure from Spending Review 2021 between 2022-23 and 2024-25 has been assumed flat in percentage of GDP terms. Data for 2021-22 not yet available.

## Some good achievements

Some of the Commission's key recommendations have been delivered or progressed this year. The UK Infrastructure Bank has been established and is already making deals. Gigabit broadband coverage continues to accelerate rapidly and now reaches over 65 per cent of premises. More renewable electricity capacity was once again deployed and government has committed to hold contracts for difference every year, which will support further deployment. Government also published *The Integrated Rail Plan*, its response to the Commission's *Rail Needs Assessment*, which set out a realistic plan for major long term investments to improve rail for the North and the Midlands.

Government has also delivered a number of important long term strategies this year including:

- The *Net Zero Strategy* should be welcomed for setting a clear high level direction for decarbonising the economy, in line with legislated targets.
- The *Levelling Up White Paper* made commitments to streamlining local growth funding and to significantly extending devolution.
- The Environment Act 2021 became law, giving government powers to mandate cooperation on regional water plans and setting out a framework to make progress on increasing recycling rates and separating food waste collection. The Environment Act 2021 also legislates to require Nationally Significant Infrastructure Projects to achieve biodiversity net gain.

## But overall, it has been a year of slow progress

Despite these achievements, overall progress against key goals over the past year has been too slow. Little progress has been made on decarbonising heating, increasing the energy efficiency of homes, delivering higher recycling rates, installing electric vehicle charge points across the country, or reducing per capita water consumption.

And some of the strategies government has developed over the last year lack detailed policy plans, leave key gaps, or do not go far enough. For example, the *Net Zero Strategy* leaves major gaps around the pathway for heating decarbonisation, how uptake of energy efficiency measures can be significantly increased, and, crucially, how the costs of transitioning to low carbon infrastructure will be fairly paid for. Whilst government's *Levelling Up White Paper* is ambitious in its scope and aims, government should prioritise reforms to local infrastructure policy and funding in order to achieve tangible improvements by 2030.

One of the key questions that many of these strategies do not address is who will pay for new infrastructure. Household expenditure, for both capital and operating expenditure, on economic infrastructure has remained broadly stable at around £7,000 per year for the past two decades. But for new infrastructure to be built — whether that be infrastructure for decarbonising freight, large scale technologies to remove greenhouse gases directly from the atmosphere, or improvements to resilience — somebody has to pay. Ultimately, that will either be taxpayers, consumers, or a combination of both. But ensuring the costs are distributed fairly is critical. Delays to decisions on who pays are now holding up delivering infrastructure, including low carbon heat and energy efficiency. Open and honest conversations, followed by clear decisions, are needed to address this.

## Falling behind in many infrastructure sectors

Slow progress over the last year means that government is not on track to deliver on many of the policies and targets set out in the *National Infrastructure Strategy*.

The Commission monitors government's progress against the recommendations the Commission has made on an annual basis. New infrastructure can rarely be built quickly. But steady progress is needed to deliver long term changes. The Commission has used five tests, described below, to assess government's actions over the last year:

- **Taking a long term perspective** – government should look beyond the immediate spending review period and sets out its expectations over the next 10 to 30 years
- **Clear goals and plans to achieve them** – there should be a specific plan for government policy ambition or endorsed Commission recommendations, with 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
- **Action 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.

### Summary of progress in each economic infrastructure sector

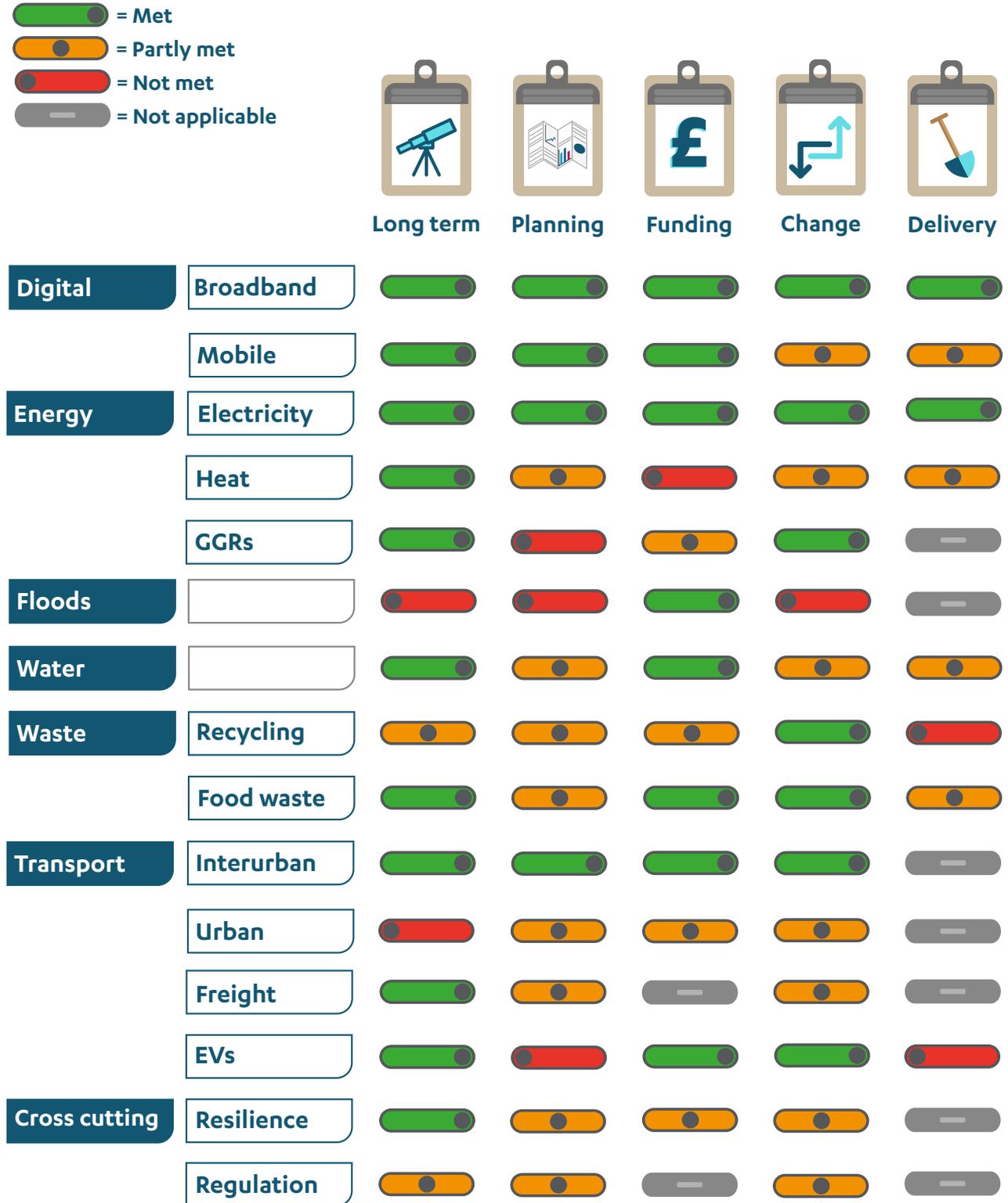
#### Digital

Government has made a genuine commitment to change digital connectivity across the country. Delivery of gigabit capable broadband networks is progressing rapidly and, in 2021, gigabit capable coverage was extended to 65 per cent of premises. If operators deliver on their published plans, government will likely achieve its target to deliver 85 per cent gigabit capable coverage by 2025 and nationwide coverage by 2030, with the support of the £5 billion subsidy programme Project Gigabit. On mobile, 4G coverage from at least one operator now extends to around 92 per cent of the UK landmass, and the new Shared Rural Network agreement should increase this to 95 per cent by 2026. But, across both gigabit and 4G networks, government must ensure that areas that are hard to reach do not get left behind.

Positive progress has also been made on 5G, with coverage now reaching around 50 per cent of premises. However, the value 5G can provide, beyond just faster 4G, remains unclear. To unlock the full benefits of 5G, government must set out an assessment of the country's future wireless connectivity needs.

Good progress is being made on developing a national digital twin, but much more work is still needed. Government must continue its support of the national digital twin programme if the country is to realise the benefits of better real time monitoring and simulation of infrastructure systems.

Figure 2: Summary of progress in each economic sector



## Energy

In 2021, government published strategies on reaching net zero and decarbonising heat and buildings. The strategies contained ambitious long term targets for the coming decades. However, concrete plans and detailed policies are still lacking in some key areas.

In 2020, renewable electricity generation made up 43 per cent of total electricity supply, an increase of around 6 percentage points on the previous year. Whilst this is expected to decrease in 2021, this is only the result of a low wind year not a change in the underlying infrastructure. Government has sound policy in place to continue this progress over the next decade. However, a significant challenge still remains to meet the government's ambition of a net zero electricity system by 2035, whilst maintaining security of supply.

Decarbonising heating is the biggest infrastructure challenge for building a net zero economy and rapid action is needed: emissions from heat need to reduce by around 50 per cent by 2035 and to near zero by 2050 from 2019 levels. In the *Heat and Buildings Strategy* government set out long term targets for decarbonising heat and improving energy efficiency. But these targets are not currently supported by a delivery plan or clear funding. Annual heat pump installations are around 36,000, far short of the government's target for 600,000 by 2028 and energy efficiency installations are also falling short of the level needed.

There are unresolved areas government needs to address, including what heating technologies are feasible and where, how to create the right incentives for people to switch from fossil fuel heating, how much investment is required and who will pay for this, and how the transition will be delivered at pace. If government is to meet its targets on heat decarbonisation, it must resolve these questions urgently.

## Flood resilience

More than five million homes in England are at risk of flooding, and climate change means the risk is growing. Government has started to act in line with commitments in the *National Infrastructure Strategy*. Government investment in flood defences has doubled and policies have been revised to emphasise catchment based planning, green infrastructure, and property level resilience. But government has yet to define long term targets for flood resilience. Until it does so, policies and investment are unlikely to fully address the flood risk.

## Water

Additional water capacity is needed to avert the real and growing risk of water shortages. In the first *National Infrastructure Assessment*, the Commission proposed addressing the growing risk of water shortages through a 'twin track' approach: reducing demand, while increasing supply. There is some evidence that government, regulators, and industry are making progress reducing leakage and developing new supply infrastructure. But per capita water consumption, already at unsustainable levels, is not yet falling. There are ambitious targets for reducing per person water consumption, but it is not clear whether the government's new policies will deliver the reductions needed.

The number of serious pollution incidents from water and sewerage remain too frequent. Around 32 per cent of water bodies in England do not have good ecological status due to continuous discharges from sewage, and 7 per cent due to stormwater overflows.

## Waste

More action is needed from government to deliver a low cost low carbon waste sector. The *Resource & Waste Strategy* and the Environment Act 2021 have indicated an ambition to incinerate less and recycle more. However, recycling rates have remained flat since the mid 2010s. Government is off track to deliver its target of 65 per cent municipal waste recycling by 2035.

## Transport

The government's *Levelling Up White Paper* is ambitious in its scope and aims, although some of its targets lack specificity. It sets out 12 missions to be achieved by 2030, including reducing gaps in productivity and bringing transport networks in major urban centres closer to the standard of London. The Commission welcomes the steps to widen devolution to more local areas and the prospect of expanding the existing devolution arrangements with city regions, starting with the Greater Manchester and West Midlands combined authorities.

But to achieve tangible improvements to local infrastructure in the next eight years, government must prioritise progress in three key areas:

1. To achieve the white paper's objective of having a globally competitive city in each region, government will need to develop a pipeline of mass transit networks for urban centres outside London, beyond the sole commitment that it has made for a new mass transit system for West Yorkshire.
2. Fundamental reform is needed to how local transport funding is allocated, with a shift away from competitive bidding between councils for multiple, centrally controlled, short term funding pots, to long term devolved funding settlements. While the white paper promises a plan for streamlining the funding landscape, this needs to be turned into real change quickly. Local areas should have robust monitoring and evaluation plans for the impact of investments, so devolution is accompanied by accountability.
3. The planned new devolution deals for local areas in England will need to be in place much sooner than 2030. Local transport authorities in these areas should receive five year integrated settlements covering funding streams for maintenance and upgrades, so they have the planning certainty to develop long term local infrastructure strategies, supported by clear project pipelines. This would mirror the important multiyear transport settlements now in place for the city regions, as recommended by the Commission.

The *Integrated Rail Plan* provides a long term plan for rail in the north and midlands to build new high speed lines and upgrade and electrify existing lines. It is sensible that the *Integrated Rail Plan* takes an adaptive approach, setting out a core pipeline of investment that should speed up delivery of benefits. However, progress with the Cambridge-Milton Keynes-Oxford Arc is less positive, with the cancellation of the plans to build the Oxford-Cambridge expressway. East West Rail presents a major growth opportunity for the Arc and government must continue with all phases of the delivery plan. Levelling up should not mean government leaving growth opportunities on the table.

Lack of action on decarbonisation of transport now poses a serious risk to delivering on the Sixth Carbon Budget. The *Transport Decarbonisation Plan* sets out long term targets for decarbonising the transport sector, including 100 per cent new sales of electric cars and vans by 2030 and a commitment for all new heavy goods vehicles to be zero emission by 2040.

But the roll out of electric vehicle charge points is far too slow. Analysis suggests that by 2030 between 280,000 to 480,000 charge points will be needed to facilitate the transition to electric vehicles. By the end of 2021 only around 28,000 charge points had been installed. Progress has been made on decarbonising freight. However, a detailed assessment of the infrastructure requirements for transitioning to zero carbon freight is still needed; this must be included in the upcoming *Future of Freight strategy*.

If progress is not made on decarbonising transport, this may compromise the country's ability to have a well functioning transport system, including building new transport infrastructure such as roads which will remain the primary mode of transport.

### **Cross cutting**

The UK Infrastructure Bank was established in 2021, as the Commission recommended, and has already started making deals. Government has also taken positive steps on infrastructure design by endorsing the Commission's design principles for national infrastructure, which are now incorporated into the Infrastructure and Projects Authority's assurance regime for major government projects. The government's recent policy paper on economic regulation showed that it understood the challenges regulation faces and the need for change. The Commission reiterates its recommendation that government should introduce net zero, resilience, and collaboration duties for Ofwat and Ofgem.

Government has accepted the Commission's recommendations on the need for clear, transparent, and regularly updated resilience standards and for stress testing that ensures standards can be met. And infrastructure resilience also appears to have moved up the public's agenda, especially following the events of Storm Arwen. The frequency of extreme weather events will only increase with climate change. The test of government's ambition in this area will be whether the forthcoming *National Resilience Strategy* provides both the strategic direction and tangible deliverables needed to strengthen resilience.

## **How to get back on track**

Urgent action is needed to ensure the government delivers on its commitments in the *National Infrastructure Strategy*. Another year of slow progress would make meeting the country's climate targets unlikely and readying infrastructure for the impacts of a changing climate more challenging. Whilst infrastructure alone is not sufficient to achieve levelling up, it has an important role to play, and significant progress must be made this year to take forward the *Levelling Up White Paper* commitments.

In this report, the Commission is setting out ten actions government needs to take over the next year to get back on track and deliver on its *National Infrastructure Strategy* and the Commission's recommendations. These are not straightforward, but they are necessary.

## **The Commission's next Assessment and future challenges**

The Commission is preparing the second National Infrastructure Assessment, to be published in the second half of 2023. This next Assessment will make a series of further recommendations to address the key long term challenges facing the country's infrastructure.

## Priorities for 2022

Set out an assessment of the country’s future wireless connectivity needs and how mobile networks will need to evolve to meet future demand, articulating the balance between what the market can deliver and where government needs to intervene



Improve energy efficiency schemes to put the country back on track to deliver the government target for as many homes as possible to be EPC C rated or above by 2035

Publish a detailed plan to deliver at least the 5 MtCO<sub>2</sub> per year of engineered removals by 2030 ambition in the *Net Zero Strategy*

Set out a long term measurable objective for what flood resilience policy in England is trying to achieve



Strengthen plans on reducing per capita water consumption to deliver on the industry target of 110 litres per person

Deliver increased recycling rates by finalising policy on key areas such as extended producer responsibility, deposit return schemes, recycling consistency and bans on certain types of plastics



Move away from competitive bidding for multiple, centrally controlled, short term funding pots and make fast progress towards devolving five year integrated funding settlements for transport spending to local authorities outside the city region combined authorities



Support local authorities in developing plans for major urban transport schemes in a number of priority cities, including plans to develop a mass transit system for West Yorkshire.

Initiate a step change in the rate of deployment of charge points to get on track to deliver the infrastructure needed to facilitate the 2030 end to new diesel and petrol car and van sales

Building on the publication of the Economic Regulation Paper to complete a review of regulators’ statutory duties

Set out improvements to resilience standards and stress testing in the *National Resilience Strategy*



# Digital

Government continues to make good progress on supporting new digital infrastructure networks. Delivery of full fibre and gigabit capable broadband networks is progressing rapidly. And government has set out ambitious targets for 4G coverage in the Shared Rural Network agreement with industry. But across both fixed and mobile networks, government must ensure that hard to reach areas do not get left behind.

In 2021, gigabit capable coverage was extended to 65 per cent of premises. If operators deliver on their published plans, and progress continues to be made on delivery of government's £5 billion subsidy programme Project Gigabit, then government will likely achieve its high level targets. This demonstrates a genuine commitment to change.

On mobile, around 92 per cent of the UK landmass now has 4G coverage from at least one operator. And the new Shared Rural Network agreement should increase this to 95 per cent by 2026. Positive progress has also been made on 5G, with coverage now reaching nearly 50 per cent of premises. However, the value that 5G can provide, beyond just faster 4G, remains unclear.

## Priority action for 2022

Set out an assessment of the country's future wireless connectivity needs and how mobile networks will need to evolve to meet future demand, articulating the balance between what the market can deliver and where government needs to intervene

## 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.

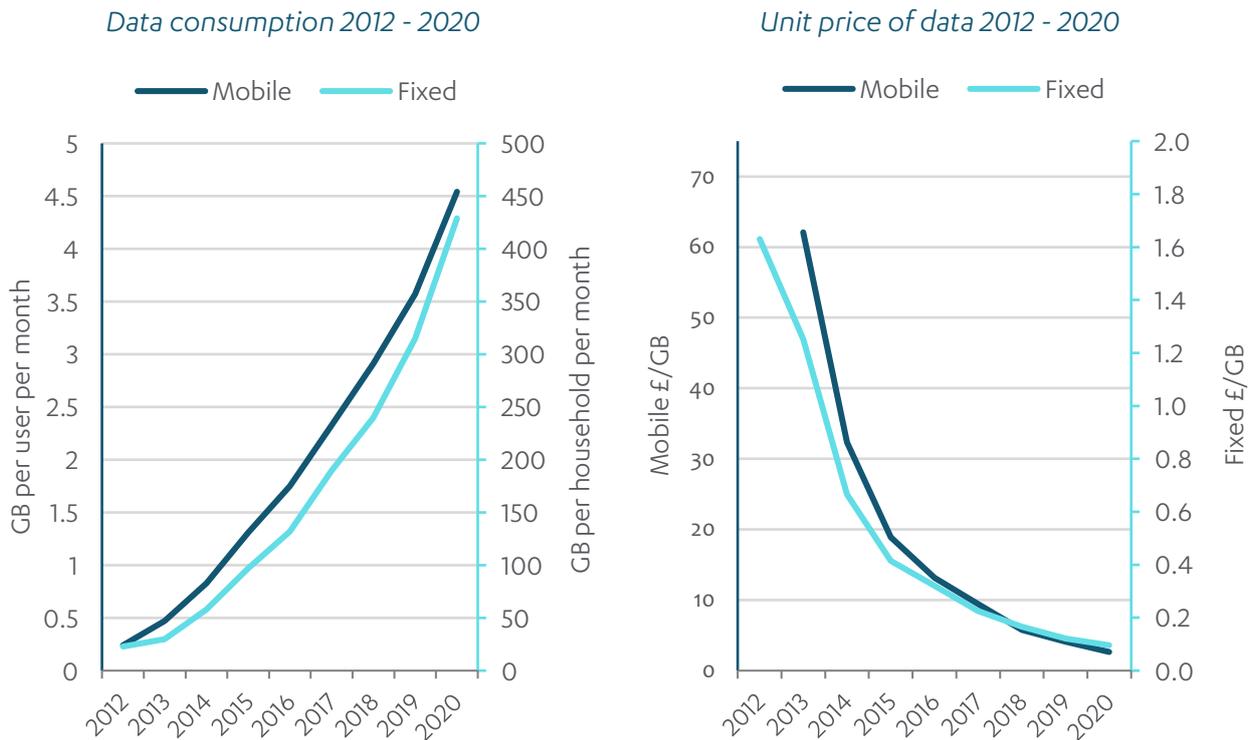
- **Fixed broadband** provides a continuous connection to the internet for homes and businesses, replacing previous 'dial up' connections. There are a range of different service levels that fixed broadband can provide, depending on which access technology is used.
- **Mobile networks** provide voice, text, and data connectivity services to consumers and businesses by using a mobile phones and other connected devices as a terminal.

The digital sector continues to perform well. Increases in consumption have been matched by reductions in unit prices (Figure 3). Despite receiving a much higher quality service, consumers pay less for both fixed and mobile services than they did a decade ago.<sup>1</sup> The UK's digital infrastructure has continued to demonstrate good resilience throughout the Covid-19 pandemic.

Around 760 outages or disruptions were reported over the last year on both the fixed and mobile networks, the majority of these being caused by hardware failures.<sup>2</sup> This is comparable, although slightly higher than, figures for previous years.<sup>3</sup> However, there is some evidence that consumers have experienced disruptions to service quality during the pandemic. Survey data found that around 70 per cent of consumers had experienced an issue with their connection over 2020-21.<sup>4</sup>

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

**Figure 3: Consumption has grown rapidly over the past decade, but unit prices have fallen at the same time**



Source: Ofcom (2021), **Communications Market Report 2021**.

## Progress against the Commission’s recommendations

### Fixed connections

#### 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.<sup>5</sup> 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 located 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.<sup>6</sup>

### **Government policy**

Government has endorsed the Commission's recommendations on full fibre rollout in the *Future Telecoms Infrastructure Review* 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.<sup>7</sup> 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.<sup>8</sup> Gigabit capable coverage refers to connections that are able to provide download speeds of 1 Gbit/s or higher and can either be delivered through a full fibre connection or a hybrid fibre coaxial cable used by Virgin Media O2. The Commission intends 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.<sup>9</sup>

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 recently published the *Wholesale Fixed Telecoms Market Review 2021 – 26*, which set out a series of decisions designed to support investment in gigabit capable networks,<sup>10</sup> including policies to promote competition between networks, where viable.<sup>11</sup> Ofcom has also allowed pricing flexibility for fibre services for the long term while protecting consumers.<sup>12</sup> This has been supported by action to remove barriers to deployment, such as Ofcom's requirements on BT to provide duct and pole access to other operators, and government reforms to wayleaves.

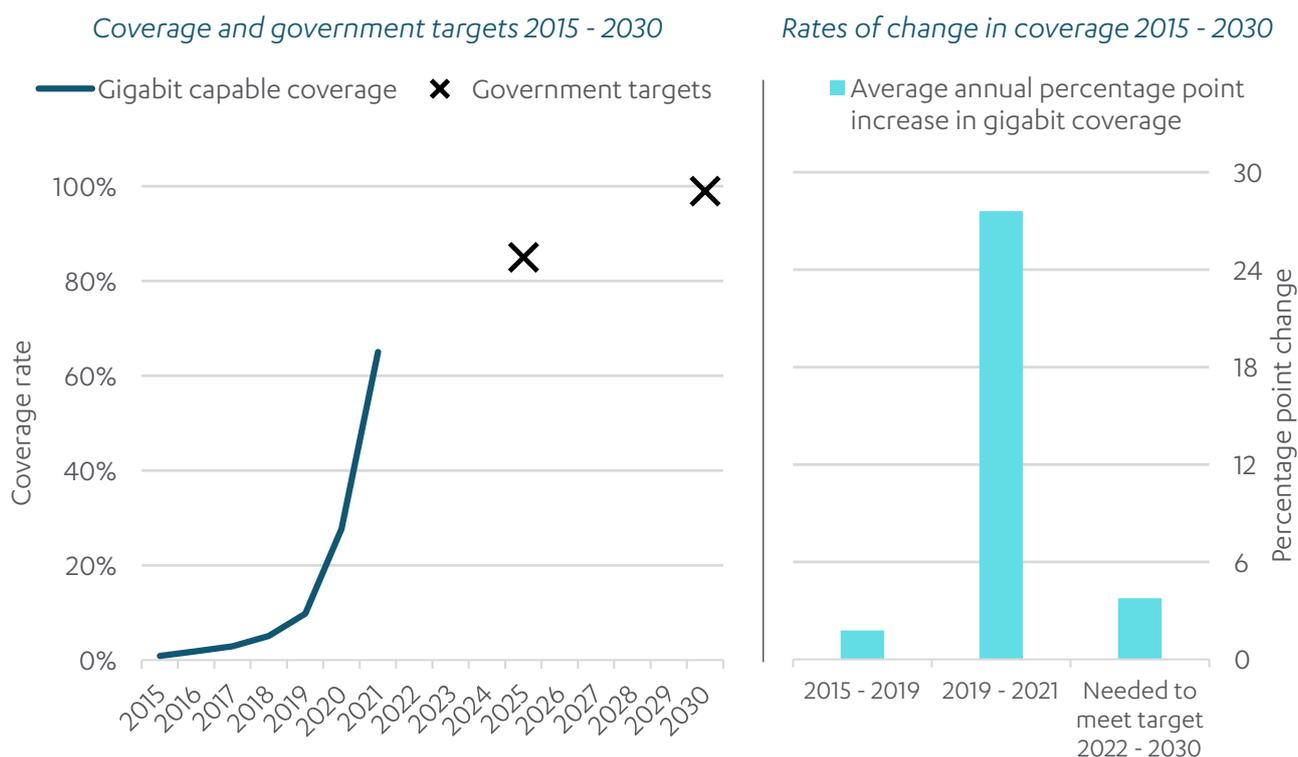
In late 2021, government published its response to an earlier call for evidence regarding access to infrastructure regulations. Government identified areas for improvement but has not yet clarified when it intends to make changes.

### **Change in infrastructure over the past year**

Progress on gigabit broadband coverage has continued over the past year. Gigabit capable coverage has increased from 37 to 65 per cent (Figure 4). The increase in coverage has largely been driven by Virgin Media O2 completing the upgrade of all its network to be gigabit capable.

Industry has also made a series of positive commitments over the past year. Openreach has committed to spend £15 billion to deliver full fibre to 25 million premises across the UK, including aiming to reach three million hard to reach homes and businesses across the country.<sup>13</sup> In 2021 Virgin Media O2 announced that it would upgrade its entire fixed network to full fibre by 2028, covering over 20 million premises after accounting for its ambition to grow its network further by 7 to 10 million premises.<sup>14</sup> CityFibre have also recently raised around £1.1 billion to fund the rollout of fibre to over 8 million premises.<sup>15</sup>

**Figure 4: Government is on track to deliver its gigabit capable target**



Source: thinkbroadband (2021), [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, government will 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: Yes.** Government's goals for 85 per cent gigabit capable coverage by 2025 and 99 per cent coverage by 2030 look beyond the current funding cycle and account for futureproofing the network.
- **Clear goals and concrete plans to achieve them: Yes.** Government is taking the right procurement approach, focused on premises that lack superfast broadband. Clear plans are in place to ensure that contracts for delivering infrastructure to hard to reach properties are launched as soon as possible.
- **Firm funding commitment: Yes.** 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: last year capital expenditure in fixed access networks increased from £3 billion to £3.2 billion.<sup>16</sup>

- **Genuine commitment to change: Yes.** 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 wayleave rules.
- **Action on the ground: Yes.** Good progress continues to be made in rolling out of gigabit capable networks. Government appears on track to deliver its target of 85 per cent coverage by 2025, provided operators fulfil their published plans which are expected to achieve at least 80 per cent gigabit coverage by 2025. Project Gigabit should then be able to support connections to the remaining 5 per cent. However, progress will slow down once coverage has reached all commercially viable premises and only hard to reach premises remain. And 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 (Figure 4), coverage can now only be expanded through delivering full fibre connections. This will take longer than simply upgrading existing hybrid fibre connections as Virgin Media O2 have been doing. Achieving nationwide gigabit coverage is a huge civil engineering project. It is therefore essential that the UK maintains a pro-investment policy and regulatory environment.

## Mobile Connections

### Commission recommendations

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.<sup>17</sup> To do this, the agreement includes a target that, by 2026:

- 95 per cent of the UK landmass will have 4G coverage from at least one operator
- 90 per cent of the UK landmass will have 4G coverage from all operators
- collectively operators will provide additional coverage to 16,000 kilometres of road.<sup>18</sup>

The deal includes over £500 million of public investment, which is matched by over £500 million of private sector investment.<sup>19</sup>

Government is still developing its strategic approach to 5G. The recent *Levelling Up White Paper* re-affirmed the government's aim for 5G coverage to be available to the majority of the population by 2027.<sup>20</sup> 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>21</sup> Other steps have been taken in developing 5G policy:

- in early 2021, Ofcom auctioned off part of the 700MHz and 3.6-3.8GHz bands to the mobile network operators, which was a significant development for 5G rollout, increasing the available capacity
- in December 2021, Ofcom introduced the first iteration of coverage metrics for 5G, which was a major step towards beginning to understand the extent of 5G coverage
- the 5G Testbeds and Trials programme, which aims to explore the benefits and challenges of deploying 5G technologies, has continued to support projects trialling new 5G use cases.<sup>22</sup>

As 4G networks are reaching full maturity and 5G rollout is gaining pace, the mobile network operators have started planning the decommissioning of the 2G and 3G network. For example, BT/EE plan to phase customers off 3G by 2023. Government announced in December 2021 that mobile network operators have confirmed that they do not intend to offer 2G and 3G services beyond 2033.

### **Change in infrastructure over the past year**

In 2021 UK 4G landmass coverage from at least one operator was 92 per cent, and 69 per cent for coverage from all operators (Figure 5). However, significant disparities between the nations persist (Figure 5). 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 80 per cent.<sup>23</sup>

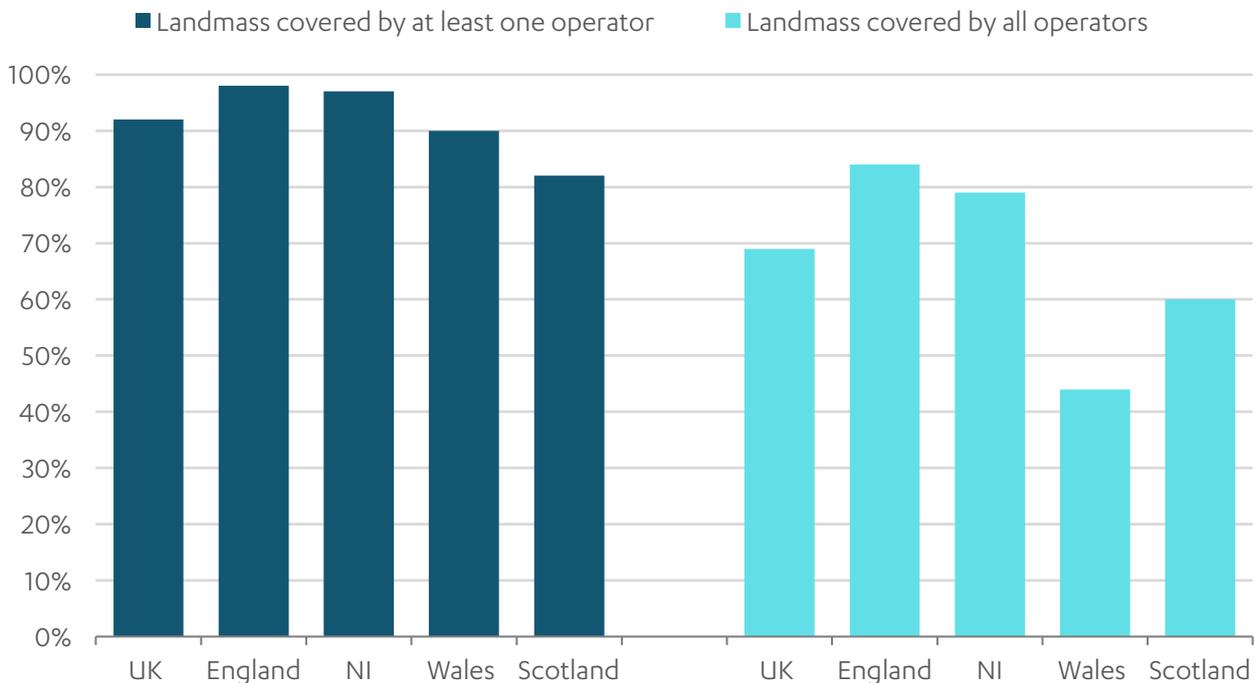
The number of premises with 5G coverage increased over 2021, with coverage available from at least one mobile network operator at around 50 per cent of UK premises.<sup>24</sup> This was driven by the doubling of the number of 5G base stations across the UK, from around 3,000 in 2020 to more than 6,500 in 2021.<sup>25</sup> However, as these base stations are primarily located in urban areas this only represents a small part of the UK landmass.<sup>26</sup>

However, 5G coverage in the UK has been rolled out on a non standalone basis. This consists of upgrading the access network to 5G but continuing to use the 4G core network. In contrast, standalone 5G requires the core network to also be upgraded. Non standalone 5G has some benefits for increased capacity and the recent increase in coverage has been driven by operators aiming to manage congestion on their networks in dense urban areas. But only standalone 5G will bring the full range of benefits, such as ultra low latency.<sup>27</sup>

5G coverage metrics are still not well defined. The use of different spectrum bands with greatly varying bandwidth and different antennae technologies deployed means that there is a large disparity in the potential 5G experience offered in different areas.<sup>28</sup>

**Figure 5: There is now good coverage of the UK landmass by at least one operator, but coverage by all operators is much lower**

Percentage of landmass covered by 4G



Source: Ofcom (2021), [Connected Nations](#), Ofcom (2021), [Connected Nations: Spring 2021](#).

### Assessment of progress

Government continues to make good progress on delivering nationwide mobile coverage. The Shared Rural Network agreement set the vision for 4G mobile connectivity across the country, and there is a clear, long term plan in place. However, this agreement must now be delivered. There is a long way to go to reach the government's targets on partial and total not spots. And, while 5G coverage increased over the past year, government is still lacking a clear vision for the role this technology will take in the long term. The upcoming *Wireless Infrastructure Strategy* must address this.

- **Taking a long term perspective: Yes.** There is a long term strategy in place for 4G coverage but more is needed to provide long term clarity on the rollout and vision for 5G coverage.
- **Clear goals and concrete plans to achieve them: Yes.** There are clear goals for 4G coverage and plans to deliver them through the Shared Rural Network agreement. However, these are not yet in place for 5G. Ofcom, working with the mobile network operators, also needs to establish a common approach to reporting.
- **Firm funding commitment: Yes.** There is clear funding in place for the Shared Rural Network agreement from government and the private sector. Currently, the vast majority of funding for 5G comes from the private sector.

- **Genuine commitment to change: Partly.** 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. The government's current target to provide 5G to the majority of the population by 2027 appears to be somewhat arbitrary and has already nearly been met.<sup>29</sup> New targets should be based on a clear picture of the future connectivity needs of consumers and the economy, and how mobile networks need to evolve to meet them. 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. Government is developing the *Wireless Infrastructure Strategy* to articulate a vision for 5G and introduce a new policy framework to encourage innovation, competition, and investment in 5G networks.
- **Action on the ground: Partly.** Good progress is being made in delivering the Shared Rural Network agreement and 4G coverage rates are already high. 5G coverage is increasing rapidly due to network competition, but coverage metrics are at an early stage of development. There is uncertainty about the future public benefits of 5G and the extent to which policy and/or regulatory interventions will be required to promote a faster, more widespread roll-out of networks.

### **Next steps in the second *National Infrastructure Assessment***

**Challenge: The digital transformation of infrastructure** – the Commission will consider how the digital transformation of infrastructure could deliver higher quality, lower cost, infrastructure services

# Energy

In 2021, government published critical strategies on reaching net zero and decarbonising heat and buildings. The strategies contained ambitious targets. However, concrete plans and detailed policies are still lacking. Over the past year, renewable energy has continued to be deployed at pace, but heat decarbonisation is lagging behind, and installations of energy efficiency measures in buildings remain low. Last year government committed to deploying engineered greenhouse gas removal technologies, and now needs to publish delivery and funding plans to support this.

Gas prices have risen sharply in recent months and the war in Ukraine is likely to push up prices further. Gas prices affect the price of heating and of electricity, as gas is used to generate electricity. This will have significant effects for many households and businesses. Whilst less than 4 per cent of Britain's gas is supplied by Russia, prices are set in wider markets where Russia plays a larger role.<sup>30</sup> The most effective and immediate response Britain can take is to reduce the use of gas through increasing the deployment of renewable electricity and increasing the energy efficiency of buildings.

Government is facilitating rapid deployment of renewable electricity generation and has sound policy in place to continue this over the next decade. In 2020, renewable generation made up 43 per cent of total electricity supply.<sup>31</sup>

Government has long term targets for decarbonising heat and improving energy efficiency, but these are not supported by a delivery plan or clear funding. The challenge of reducing emissions from heat is now urgent.

In the *Net Zero Strategy* government has for the first time committed to deploying engineered greenhouse gas removal technologies and set an ambition in line with the Commission's recommendation for deployment by 2030. But detailed policy must now be rapidly developed if this ambition is to be met.

## Priority actions for 2022:

Improve energy efficiency schemes to put England on track to deliver the government target for as many homes as possible to be EPC C rated or above by 2035

Publish a detailed plan to deliver at least the 5 MtCO<sub>2</sub> per year of engineered removals by 2030 ambition in the *Net Zero Strategy*

## The energy sector

The energy sector covered by the Commission largely consists of two key networks: electricity and natural gas. It also includes new infrastructure networks and technologies that will be required to decarbonise the country, such as hydrogen and engineered greenhouse gas removals

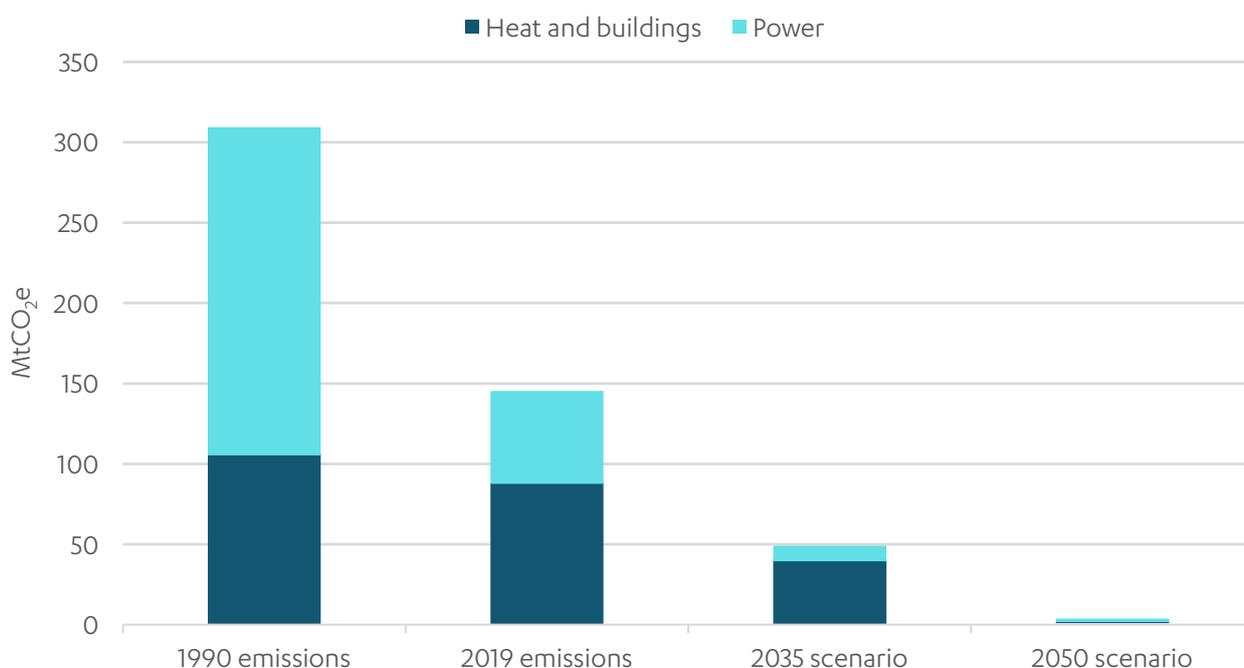
The energy sector remains far too carbon intensive. Greenhouse gas emissions from the energy sector have reduced (figure 6), but this has been driven primarily by reducing emissions from electricity generation (figure 6). Further reductions and a move to a fully low carbon generation mix will be needed within the next 13 years to meet the UK's decarbonisation targets. 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 and to near zero by 2050 from 2019 levels.

The sector continues to provide a high quality and reliable service. While outages happen, the UK's energy sector is one of the most reliable in the world, with comparatively few interruptions in supply that affect consumers, and these have been reducing over time.<sup>32</sup> Incidents causing a loss of supply are rare. However, when they do happen, as after Storm Arwen in November 2021 and Storms Eunice and Franklin in 2022. They are a painful reminder of how essential a reliable supply of electricity is, and how important it is for the system to be resilient to such events and able to respond and recover quickly.

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 6: Emission reductions have been driven by electricity in recent years

*Actual and potential emissions in the government's net zero delivery pathways (central estimate of upper and lower range used)*



Source: Department for Business, Energy & Industrial Strategy (2021), [Net Zero Strategy – charts and tables](#). Note: the figure uses 2019 emissions rather than 2020 emissions due to uncertainty around the short term impact the Covid-19 pandemic may have had on emissions.

# Progress against the Commission's recommendations

## Electricity generation

### Commission recommendations

In the first *Assessment* the Commission found that, over the long term, the UK could have a low cost and low carbon energy system, powered primarily by wind and solar.

The Commission recommended that government act to deliver 65 per cent of Britain's electricity from renewables by 2030.<sup>33</sup> To deliver this the Commission recommended that:

- contracts for difference auctions be used for the overwhelming majority of the increase in renewable capacity required, with government setting out indicative budgets and timelines
- contracts for difference auctions for onshore wind and solar should be reopened.

Increasing deployment of renewables will decrease reliance on natural gas for generating electricity. Alongside reducing emissions, this will reduce exposure to natural gas prices affected by Russian supplies.

In its *Smart Power* study, the Commission called on government to increase the flexibility of the electricity system by increasing electricity interconnection and facilitating increased deployment of storage and demand side response.<sup>34</sup>

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. In September 2021, the Commission advised government that the sixth Carbon Budget did not result in a change to this advice. Other technologies can deliver an electricity system consistent with meeting the sixth Carbon Budget and these technologies are less risky than delivering more than one new nuclear plant by 2035.<sup>35</sup> The timelines for deploying additional plants mean nuclear cannot play a short term role in reducing reliance on natural gas.

### Government policy

In the *National Infrastructure Strategy*, government mostly endorsed the Commission's recommendation to deliver 65 per cent renewable electricity by 2030 and in the *Net Zero Strategy* committed to a fully decarbonised power system by 2035, subject to security of supply.<sup>36</sup> This follows on from previous announcements to target 40 GW of offshore wind (including 1 GW floating offshore wind) by 2030, and to reintroduce onshore wind and solar into the contracts for difference auctions.<sup>37</sup> Government has also committed to hold annual contracts for difference auctions.<sup>38</sup> The government is working on options to coordinate the buildout of a North Sea grid through the Offshore Transmission Network Review, which is a key enabler of offshore renewables.<sup>39</sup>

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 a number of actions to reduce barriers to deployment and committed to monitor the success of actions to increase flexibility through the flexibility monitoring framework.<sup>40</sup> Government recently launched a call for evidence in 2021 on the role for large scale, long duration energy storage, recognising that is not currently attracting enough investment nor being built at sufficient scale.

The government is also making progress in bringing one new large scale nuclear project, beyond Hinkley Point C, to Final Investment Decision by the end of this Parliament, subject to it being good value for money and securing all relevant approvals. A decision was made in 2021 that new nuclear projects would be funded using a regulated asset base.<sup>41</sup>

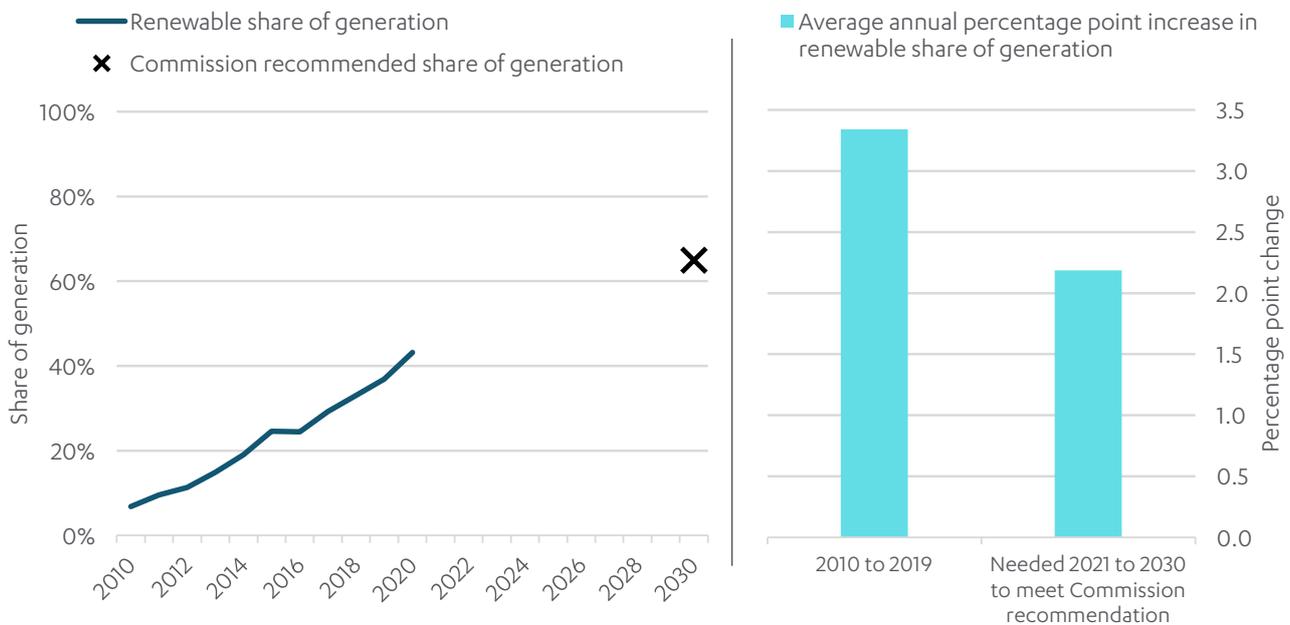
**Change in infrastructure over the past year**

Renewables share of electricity generated increased to 43 per cent in 2020, up from 37 per cent in 2019.<sup>42</sup> Despite generation capacity increasing since the end of 2020, the share of renewable generation over 2021 is likely to be lower due to low average wind speeds affecting the output of wind turbines. This highlights the importance of having a range of generation and storage technologies available to support security of the electricity supply. Interconnector capacity has increased from 4 GW in 2016 to 6 GW in 2021, and storage capacity has increased from 3 GW in 2016 to 4 GW in 2021.<sup>43</sup>

**Figure 7: Renewable deployment is on track to deliver the Commission’s recommendation**

*Share of generation and Commission target 2010 - 2030*

*Rates of change 2010 to 2030*



Source: Department for Business, Energy & Industrial Strategy (2021), [Energy Trends: UK renewables Renewable electricity capacity and generation \(ET 6.1 - quarterly\)](#).

**Assessment of progress**

Government is facilitating rapid deployment of renewable electricity generation and has ambitious commitments and concrete policy in place to continue this over the next decade. However, there is a significant delivery challenge ahead that must be overcome. In the last decade renewable electricity increased from around 7 per cent of total generation to 43 per cent, but over the next decade this needs to increase to over 65 per cent at a time when overall electricity demand is set to substantially increase.<sup>44</sup> Successfully deploying more renewable electricity generation also creates new challenges for cost effectively balancing the system. Alternatives to using natural gas for balancing exist, but deployment needs to accelerate.

- **Taking a long term perspective: Yes.** Government has set a long term strategy with a focus on significantly increasing renewable capacity to deliver a decarbonised system by 2035, subject to security of supply. Government has also recognised the critical role of low carbon flexibility and the need to take action to significantly increase deployment.
- **Clear goals and concrete plans to achieve them: Yes.** Government has set a clear goal of a fully decarbonised electricity system by 2035, with generation capacity to be delivered mainly through contracts for difference auctions. It has committed to monitoring the success of its actions to increase the flexibility of the electricity system and adapting policy if necessary.<sup>45</sup> However, the challenges of delivering these commitments are significant.
- **Firm funding commitment: Yes.** 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. Government has committed £265 million to the next auction, to be completed in 2022.<sup>46</sup> Additional funding may be needed to support deployment of flexibility solutions to ensure security of supply.
- **Genuine commitment to change: Yes.** The government has accepted the Commission's recommendations of a highly renewable system, with security of supply delivered by flexibility. Some government goals for electrification in heat and surface transport are also reliant on a secure, low carbon electricity system, underlining this commitment.
- **Action on the ground: Yes.** Contracts for difference auctions continue to be used to deploy renewables at pace and the government is on track to reach the level of renewable deployment recommended by the Commission (Figure 7). Since the Commission published its *Smart Power* report, more flexible assets have been deployed. But delivery is a major challenge – renewable generation needs to increase significantly and the use of natural gas to provide flexibility needs to be largely replaced over the next decade.

## Next steps in the second National Infrastructure Assessment

**Challenge: Decarbonising electricity generation** – the Commission will consider how a decarbonised, secure and flexible electricity system can be achieved by 2035 at low cost

### Heat and energy efficiency

#### Commission recommendations

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.

Energy efficiency can reduce the cost of heating a home and increase options for low carbon heating. The Commission recommended that government set a target of 21,000 measures a week for installations of energy efficiency measures in England, with policies to support this including funding of £3.8 billion up to 2030 for improvements in social housing, trialling innovative approaches for driving energy efficiency in owner occupied homes, and tightening regulations and enforcement in the private rented sector.

Recent energy price rises have brought the cost of heating homes into stark focus. Consumer energy demand can be reduced through targeted energy efficiency improvements, and this becomes even more important in times when energy bills are increasing. 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.

### **Government policy**

In October 2021 the government published a *Heat and Buildings Strategy* setting out plans to cut emissions from heating via a gradual transition which will start by driving down the cost of heat pumps and incentivising take up.<sup>47</sup> It set an ambition to phase out the installation of natural gas boilers from 2035 and a commitment to install 600,000 heat pumps annually by 2028, primarily through:

- the Boiler Upgrade Scheme, which run from 2022-23 to 2024-25 and will offer £5,000 grants for low carbon heating systems up to a total value of £450 million for homeowners and residential landlords; government expects this to deliver around 30,000 heat pumps for each year it is running<sup>48</sup>
- a market based mechanism, currently out for consultation, to drive heat pump installations by placing an obligation on fossil fuel heating system manufacturers to achieve the sale of a certain level of heat pumps; government expects this to deliver between 210,000 and 330,000 heat pumps per year by 2028.<sup>49</sup>
- the Future Homes Standard, which will ensure that all English homes built after 2025 produce no operational carbon dioxide;<sup>50</sup> government expects this to deliver around 200,000 heat pumps per year by 2028.<sup>51</sup>

In addition, the *Heat and Buildings Strategy* set out plans to make a strategic decision on the role of hydrogen in decarbonising heat in 2026.<sup>52</sup>

The government did not agree with the Commission's recommendation to target 21,000 energy efficiency installations per week. It argued that a measures based target could lead to a focus on measures installed at the expense of the energy or emissions reduced. Government committed to developing a new metric that rewarded actual energy and carbon reductions for non-domestic buildings.<sup>53</sup>

Government's current target is to upgrade as many homes as possible to a rating of Energy Performance Certificate (EPC) Band C by 2035.<sup>54</sup> However, the government's main energy efficiency and low carbon heating subsidy scheme – the Green Homes Grant Voucher Scheme – was closed to new applications in March 2021. Funding for local authority delivered schemes continues with £300 million of additional funding allocated.<sup>55</sup> In the past year £800 million of funding has also been allocated to the social housing decarbonisation fund over the next three years, in line with the Commission's recommendation.<sup>56</sup>

The government has also announced a further £950 million for the Home Upgrade Grant, a scheme to improve energy efficiency and install low carbon heating in fuel poor homes not connected to the gas grid.<sup>57</sup>

### **Change in infrastructure over the past year**

Steps have been taken to establish the safety case for hydrogen for heat, with the Hy4Heat programme running full hydrogen boilers in purpose built unoccupied demonstration homes.<sup>58</sup> A neighbourhood trial of hydrogen is due to start in 2023 with the H100 Fife Neighbourhood Trial, followed with a village trial by 2025.

Heat pumps have also been trialled and the evidence base on suitability for different property types is growing. The recent Electrification of Heat UK Demonstration Project has installed 742 heat pumps in a wide range of property types and will now monitor how they perform. Whilst the number of consumers installing a heat pump each year has been growing, UK heat pump sales remain very limited, at around 36,000 per year, in comparison with sales of fossil fuel boilers.<sup>59</sup>

The energy performance of the housing stock has been increasing in recent years. Survey data suggested that the proportion of homes rated EPC C or better has risen from 12 per cent in 2010 to 40 per cent in 2019.<sup>60</sup> The rate of change saw a material dip in 2014 as a result of changes to government schemes to support the installation of energy efficiency measures.

### **Assessment of progress**

Government has long term targets for decarbonising heat and improving energy efficiency, but these are not yet fully supported by a delivery plan or clear funding. The need to meet the Sixth Carbon Budget means that resolving the challenges in decarbonising heat are now urgent.

- **Taking a long term perspective: Yes.** Government is taking a long term perspective by committing to take a decision on the role of hydrogen in home heating by 2026, setting targets for 600,000 heat pump installations by 2028, phasing out natural gas boiler installations by 2035, and increasing the energy efficiency of buildings.
- **Clear goals and concrete plans to achieve them: Partly.** Detail on how long term targets will be delivered is still under development, including how government will address the major questions still to be answered on decarbonising heat. Government has delivered on its commitment to consult on moving to an approach which measures and rewards actual energy and carbon reductions.<sup>61</sup>
- **Firm funding commitment: No.** Government's current strategy for decarbonising heat relies heavily on the cost of heat pumps and hydrogen falling rapidly. A significant proportion of the government target for heat pump deployment will need to be delivered through the government's market mechanism, which may not deliver if the cost of heat pumps does not fall in line with the government's stretching ambitions. Government has allocated short term funding to improve energy efficiency in social housing and low income households through their local authorities and is using regulation to support improvements in the private rented sector. There remains a lack of incentive to encourage improvements in energy efficiency by owner occupiers.

- **Genuine commitment to change: Partly.** The net zero target, and interim Carbon Budgets, make it clear that change is needed but without detailed plans to support this, it is not yet clear a genuine commitment has been made. There are unresolved areas government needs to address, including what heating technologies are feasible and where, how to create the right incentives for people to switch from fossil fuel heating, how much investment is required and who will pay for this, and how all of this will be delivered at pace.
- **Action on the ground: Partly.** Progress has been made on building the evidence base for heat pumps and hydrogen over 2021, but at scale trials of hydrogen for heating will come later than recommended and heat pumps trials are not yet delivering performance data. On energy efficiency, analysis from the Climate Change Committee suggests that if the government's target for 2035 is to be met, the number of energy efficiency installations will need to increase significantly.<sup>62</sup>

## Next steps in the second *National Infrastructure Assessment*

**Challenge: Heat transition and energy efficiency** – the Commission will identify a viable pathway for heat decarbonisation and set out recommendations for policies and funding to deliver net zero heat to all homes and businesses

### New infrastructure networks

#### Commission recommendations

To meet the net zero target, new infrastructure networks will be required to remove greenhouse gases from the atmosphere and store them permanently underground.

In its recent study, *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 in 2022 a detailed plan to support deployment.<sup>63</sup> The Commission also recommended that government deliver sufficient carbon transport and storage networks to serve engineered greenhouse gas removals plants.

#### Government policy

In the Net Zero Strategy the government has, for the first time, committed to deploy engineered greenhouse gas removal technologies in the UK.<sup>64</sup> Government set an ambition to use engineered removals to extract 5 MtCO<sub>2</sub>e from the atmosphere each year by 2030, reaching around 23 MtCO<sub>2</sub>e per year by 2035. Development of the detailed policy frameworks to support this is ongoing, with plans for consultations on potential business models and reforms to the UK emissions trading scheme planned.<sup>65</sup> Progress is also being made on support for early stage engineered removals, with funding awarded to projects through a £70 million competition.<sup>66</sup>

At the same time, government has significantly increased its ambition on deploying carbon capture and storage networks. It is now aiming to deploy between 20 and 30 MtCO<sub>2</sub>e capacity by 2030.<sup>67</sup> In the last year, government announced Hynet and the East Coast Cluster as the first two carbon capture and storage clusters to receive support.<sup>68</sup>

## Assessment of progress

The *Net Zero Strategy* demonstrates positive ambition for engineered removals, but detailed policy must now be rapidly developed to turn this into a genuine commitment to delivering at scale engineered removals in the UK.

- **Taking a long term perspective: Yes.** Government has begun to set out long term targets for engineered removals deployment and now needs to consult on how it will support the sector to deliver what is needed to meet its ambition for 2030 and beyond.
- **Clear goals and concrete plans to achieve them: No.** While government has committed to consulting on business models, a comprehensive and detailed plan for delivering engineered removals is needed before the end of 2022.<sup>69</sup>
- **Firm funding commitment: Partly.** Developing policy for who will pay for engineered removals will be essential to enable their deployment, however the proposed consultation on the role of the UK emissions trading scheme (where funding will come from polluters) is already behind schedule.
- **Genuine commitment to change: Yes.** In the *Net Zero Strategy* the government has, for the first time, committed to deploy engineered greenhouse gas removal technologies in the UK. Government now needs to set out delivery and funding plans to deliver this commitment.
- **Action 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.

## Next steps in the second *National Infrastructure Assessment*

**Challenge: Networks for hydrogen and carbon capture and storage** – the Commission will assess the hydrogen and carbon capture and storage required across the economy, and the policy and funding frameworks needed to deliver it over the next 10 to 30 years

# Flood resilience

**More than five million homes and properties in England are at risk of flooding,<sup>70</sup> and climate change means the risk is growing.<sup>71</sup> Government has started to act. National policies have been strengthened and investment has doubled. But government has yet to specify long term targets for flood resilience.**

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 flood defences has doubled and policies have been revised to emphasise catchment based planning, green infrastructure, and property level resilience. But government has yet to define 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*.

**Priority action for 2022:** set out a long term measurable objective for what flood resilience policy in England is trying to achieve

## The flood resilience sector

In 2020, more than five million properties in England were at risk of flooding,<sup>72</sup> although the level of risk differs by area. Around 2.5 million properties are at risk of flooding from rivers and the sea and around 3.2 million at risk from flooding from surface water.<sup>73</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 infrastructure asset sites.<sup>74</sup>

Lack of data makes it challenging to assess the overall performance of the flood resilience sector.<sup>75</sup> Central government spending on flood risk management is around £15 per household per year, and capital investment around £19 per household per year.<sup>76</sup> There is some evidence that flood risk management has led to improvements in the quality and quantity of habitats, but it is hard to understand the scale of these impacts.<sup>77</sup>

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 homes have been moved to a lower risk category through improved flood risk management.<sup>78</sup> The government's investment between 2015 and 2021, which equated to £2.6 billion, improved protection for over 300,000 homes.<sup>79</sup> Although this is an easy to understand measure of performance, it does not provide a good view of overall progress in tackling flood risk. This is because it does not account for

better protection of businesses or infrastructure. 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>80</sup>

The Commission has set out a more detailed overview of the floods sector [\*\*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

In previous decades, flood resilience policy in England has too often been reactive and piecemeal in nature, with unclear objectives and stop start funding cycles.

In the first *Assessment*, the Commission recommended that government introduce a national flood resilience standard, such that by 2050 all communities would be resilient to flooding events with annual likelihood of 0.5 per cent (one in 200 years). In densely populated areas, where the costs per household of providing defences are lower, the Commission proposed a higher standard of resilience against flood events with annual likelihood of 0.1 per cent (one in 1,000 years).<sup>81</sup> These standards 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 is 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>82</sup>

### 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 floods, including delivering nationwide resilience, using green and grey infrastructure, and delivering resilience measures at the property level, as recommended by the Commission.<sup>83</sup>

However, government did not set national standards of flooding resilience, or a clear long term objective 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>84</sup> Work by the Environment Agency to develop those indicators is ongoing, and due to be complete in spring 2022.<sup>85</sup>

The government will also invest £5.2 billion in flood and coastal defences between 2021 and 2027. This investment aims to 'better protect' 336,000 properties by 2027.<sup>86</sup>

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

- the government concluded a call for evidence on ways it could take account of local circumstances when allocating investment, and announced that it will launch a consultation on options to achieve this<sup>87</sup>
- the Environment Agency published the initial list of flood and coastal erosion risk management schemes it plans to take forward under the 2021 to 2027 funding settlement<sup>88</sup> and planned to invest £860 million on the design and construction of more than 1,000 schemes in 2021-22<sup>89</sup>
- the government published its review of planning policy for development in flood risk areas<sup>90</sup> and committed to issuing local planning authorities with guidance on their duties and on using developer contributions for flood resilience schemes.<sup>91</sup>

### Assessment of progress

Over the past year, progress in developing policy to address the challenge of flooding in the UK has been slow. Allocating £5.2 billion in funding over the next six years was a positive first step, but 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 through to 2050, and clarity on the long term funding to deliver this. The new flood resilience indicators, due to be published in the coming months, could provide the basis for setting such targets and for measuring performance against them.

- **Taking a long term perspective: No.** Government has not set out either targets or investment plans for flood resilience beyond 2027, as the Commission recommended.
- **Clear goals and concrete plans to achieve them: No.** 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 objectives 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: Yes.** Government has allocated £5.2 billion for the next six years to flood and coastal defences, 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: No.** Until government sets out long term plans to maintain and improve nationwide flood resilience by 2050 its actions will not constitute a genuine commitment to change.
- **Action on the ground: Not applicable.** The Environment Agency continues to deliver flood resilience schemes, with initial design and construction work on more than 1,000 schemes due to start in 2021-22.<sup>92</sup> As the first full financial year of the government's new 2021 to 2027 investment plan has not yet concluded, it is too soon to assess progress against delivery.

## **Next steps in the second *National Infrastructure Assessment***

**Challenge: Surface water management** – the Commission will consider actions to maximise short term opportunities and improve long term planning, funding and governance arrangements for surface water management, while protecting water from pollution from drainage. The Commission will deliver this as a separate study and report to government by November 2022, in advance of its other recommendations

# Water

**Additional capacity is needed to avert the real and growing risk of water shortages. Plans for additional supply infrastructure are advancing and there is some evidence that leakage is falling, although it is too soon to see a sustained trend. But per capita consumption is not yet falling, and stronger policies may be needed to address this.**

In the first *National Infrastructure Assessment*, the Commission proposed addressing the growing risk of water shortages through a ‘twin track’ approach: increasing supply, while reducing demand. To deliver this, the Commission called for the creation of additional supply and a national water transfer network, ambitious targets for leakage reduction, and compulsory metering, including requiring companies to consider systematic roll out of smart meters to drive down water consumption.

There is now some early evidence that government, regulators, and industry are making progress on developing new supply infrastructure and on reducing leakage. But per capita consumption, already at unsustainable levels, is not yet falling. The sector has set ambitious targets, and published draft regional plans for future water resources, but it is not clear whether the government’s new policies will support the reductions needed.

**Priority action for 2022:** Strengthen and progress plans for reducing per capita water consumption to deliver the targeted 110 litres per person per day by 2050

## The water sector

The water sector delivers water of reliable quality to homes and businesses across the country. Significant drinking water quality incidents are rare,<sup>93</sup> and unplanned interruptions to water supply have fallen by one third since 2012.<sup>94</sup> However, over the coming decades the UK faces a real and growing risk of water shortages, especially in the south east of England.<sup>95</sup>

In the first *Assessment*, the Commission found that maintaining current levels of 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>96</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>97</sup>

There are also challenges with serious pollution incidents from water and sewerage. These have plateaued at an unacceptably high level. 32 per cent of water bodies in England do not have good ecological status due to continuous discharges from sewage, and 7 per cent due to stormwater overflows.<sup>98</sup>

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 the performance of the sector is available online](#).

## Progress against the Commission's recommendations

### Commission recommendations

In the first Assessment, the Commission set out a vision for water 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 metering, and new supply infrastructure could each provide around a third of the capacity required.<sup>99</sup>

To deliver this vision, the Commission recommended that:

- 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
- 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.<sup>100</sup>

Since the first *Assessment* was published, the water sector has worked to develop updated estimates of future capacity needs.<sup>101</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>102</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 halving leakage and increasing supply.<sup>103</sup>

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>104</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>105</sup>

The sector is also 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>106</sup> and to halve leakage by 2050.<sup>107</sup>

Government did not accept the Commission's recommendations on reducing per capita water consumption through mandatory metering. In the last 12 months, it has instead announced alternative measures to reduce per capita consumption, including:

- designating additional 'areas of serious water stress', where water companies can introduce compulsory metering where this is cost effective and has customer support
- introducing mandatory water efficiency labels on domestic and business use products, with a consultation to come in 2022

- developing a roadmap on water efficiency in buildings, looking at the long term needs of the industry, due to be published in late 2022
- ‘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.<sup>108</sup>

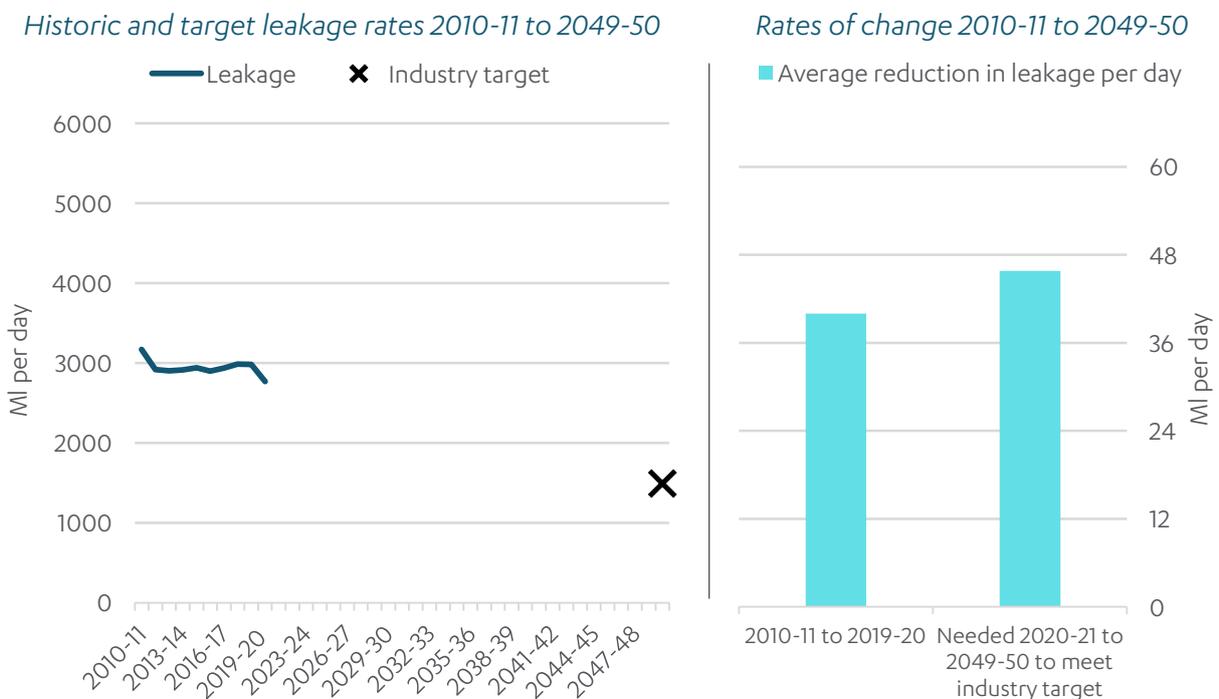
Taken together the recently published draft regional plans for water resources will struggle to achieve the 110 litres per person per day target set out by government in its *Strategic Policy Statement*<sup>109</sup> without further government action at the national level.<sup>110 111</sup>

### Change in infrastructure over the past year

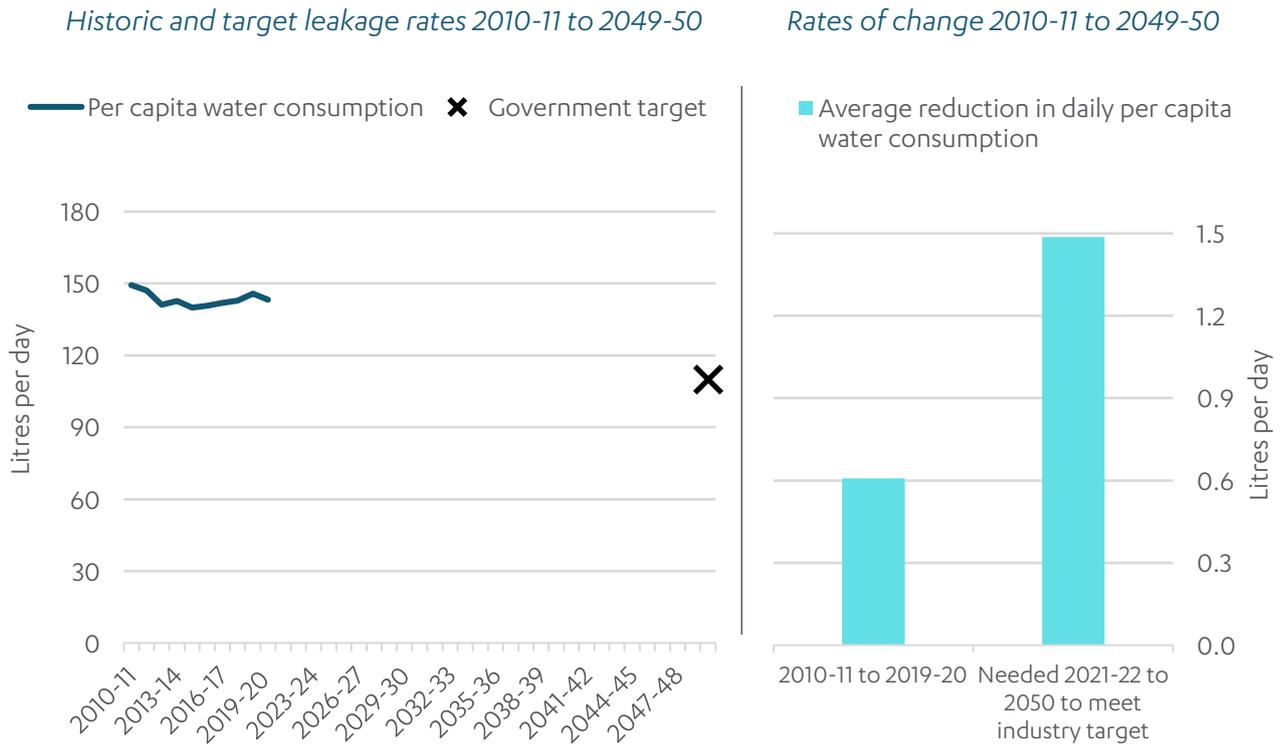
There has been some change in the country’s water infrastructure over the past year. The draft regional plans set out how each of the five regional groups intends to develop additional supply over the coming decades. Havant Thicket Reservoir, the first new reservoir to be built in the south east since the 1970s,<sup>112</sup> obtained formal planning permission in 2021 and is due to be built by 2029.<sup>113</sup>

There is some evidence that leakage rates have been reducing in recent years (Figure 8) and daily per capita consumption has remained broadly flat over the past decade (Figure 9). In 2020-21 leakage rates increased to 2,820 mega litres per day from 2,770 mega litres per day in 2019-20.<sup>114</sup> Daily per capita water consumption increased to 155 litres per day in 2020-21, from 143 litres per day in 2019-20.<sup>115</sup> However, this may be the result of short term changes in behaviour driven by the Covid-19 pandemic. Water demand previously generated by premises such as offices or gyms relocated to the homes during the pandemic, which may have affected over all leakage rates and consumption levels.<sup>116</sup>

**Figure 8: Leakage rates have begun to fall, but continued progress is needed to deliver the Commission’s recommendation**



Source: Consumer Council for Water (2015), [Data Appendices 2014-15](#); Consumer Council for Water (2017), [Data Appendices – Water resilience](#); Consumer Council for Water (2020), [Water, water everywhere? Water & wastewater resilience report 2019/20](#). Note: Data from 2020-21 excluded from the chart as it may not represent long term trends given disruption caused by the Covid-19 pandemic.

**Figure 9: Water consumption is not yet falling consistently year on year**

Source: Consumer Council for Water (2015), [Data Appendices 2014-15](#); Consumer Council for Water (2017), [Data Appendices – Water resilience](#); Consumer Council for Water (2020), [Water, water everywhere? Water & wastewater resilience report 2019/20](#). Note: Data from 2020-21 excluded from the chart as it may not represent long term trends given disruption caused by the Covid-19 pandemic.

### Assessment of progress

Government has taken a long term approach to the water sector, but it is not yet clear if it has developed sufficient plans to deliver on its goals. There is now some early evidence that government, regulators, and industry are making progress on developing new supply infrastructure and on reducing leakage. But per capita consumption is not yet falling. The sector has set ambitious targets, but it is not clear whether the government's new policies will deliver the reductions needed.

- **Taking a long term perspective: Yes.** 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 is acting to expand supply over the coming decades. The draft regional plans clearly acknowledge the water security challenge and are the first step towards delivering coordinated, long term solutions.
- **Clear goals and concrete plans to achieve them: Partly.** The Strategic Policy Statement gives Ofwat clear targets for reducing leakage and per capita consumption, both at least matching the rate of progress recommended by the Commission. The sector is also planning new supply infrastructure to provide the additional capacity recommended by the Commission. It is not clear whether they will reduce consumption to the 110 litre per person per day target set out in Strategic Policy Statement.

- **Firm funding commitment: Yes.** Ofwat’s allocation of £469 million to fund the development of new water supply infrastructure is an important first step. This, combined with RAPID’s work to accelerate infrastructure delivery, should increase the number of supply schemes reaching the ‘construction ready’ stage by the next price review period.<sup>117</sup>
- **Genuine commitment to change: Partly.** Until recently, progress in reducing leakage had largely stalled; the commitment to halving it by 2050 is a positive start. The allocation of £469 million towards developing new supply solutions — and the creation of RAPID to accelerate delivery — also show a strong commitment to delivering at the scale and pace needed. But action to address per capita consumption has been slower and more limited.
- **Delivery on the ground: Partly.** It is too soon to assess whether government and industry are on track to close the water deficit by 2050. There are early signs of progress on supply and leakage. However, per capita consumption is not yet falling (Figure 9).

# Waste

**More action is needed from government to deliver a low cost low carbon waste sector. The *Resources and Waste Strategy* and the *Environment Act 2021* have indicated an ambition to incinerate less and recycle more. However, recycling rates have remained flat since the mid 2010s. Focus needs to shift from strategy to delivery.**

Government has gone some way to demonstrating a genuine commitment to increasing recycling rates, but concrete plans are needed to achieve the targets. Finalising policy on key areas such as extended producer responsibility, deposit return schemes, recycling consistency and bans on certain types of plastics, would help to address the current recycling plateau.

Government has demonstrated a genuine commitment to reducing emissions from food waste, supported by a clear funding commitment to separately collect food waste and divert it to anaerobic digestion for biogas production. Clear plans should now be delivered to ensure all local authorities achieve separate collection by 2025.

**Priority action for 2022:** Deliver increased recycling rates by finalising policy on key areas such as extended producer responsibility, deposit return schemes, recycling consistency and bans on certain types of plastics

## The waste sector

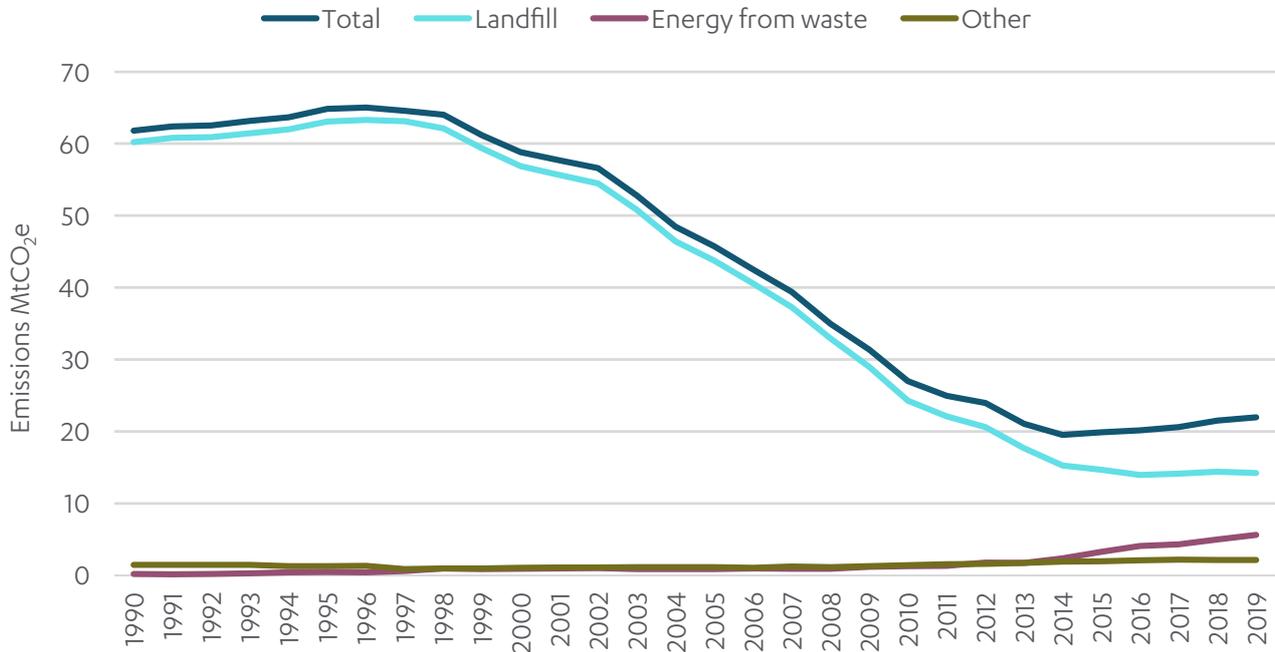
The performance of the waste sector has remained stable. Recycling rates for local authority collected waste are around 43 per cent, with the UK continuing to lag behind the best international performers in recycling.<sup>118</sup> Households pay around £150 a year for waste management, which has remained broadly stable in recent years,<sup>119</sup> with customer service satisfaction also consistently high.<sup>120</sup>

Greenhouse gas emissions from waste have continued to increase, if the emissions from energy from waste plants are accounted for. Emissions from waste peaked in 1996 and decreased steadily as biological waste was diverted from landfill, reducing methane emissions. Since the mid 2010s, emissions have increased by around 15 per cent as waste arisings grew, use of energy from waste plants increased and recycling rates stagnated.<sup>121</sup>

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 10: 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**

*Waste emissions by disposal method 1990 to 2019, UK*



Source: Department for Business, Energy & Industrial Strategy (2021), *Final UK greenhouse gas emissions statistics*. Note: Data from 2020-21 excluded from the chart as it may not represent long term trends given disruption caused by the Covid-19 pandemic.

## Progress against the Commission's recommendations

### Increasing recycling rates

#### Commission recommendations

In the first Assessment the Commission recommended that government should set a target for recycling 65 per cent of municipal waste and 75 per cent of plastic packaging by 2030.<sup>122</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.

## Government policy

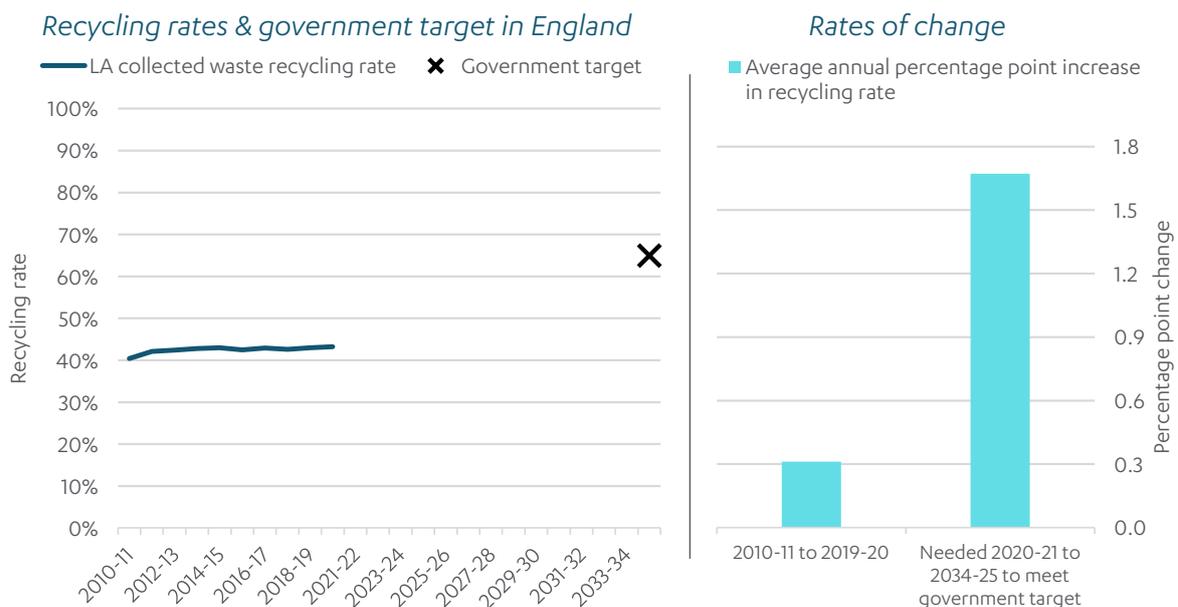
The government's key driver of waste policy remains the *Resources and Waste Strategy* published in 2018. This strategy set a target for 65 per cent of municipal waste to be recycled by 2035.<sup>123</sup> This is later than the Commission recommended, but it should help achieve a consistent recycling collection by local authorities and businesses. The government did not endorse the Commission's recommendation to set individual targets for each local authority. Instead, it plans to develop performance indicators which will allow local authorities to benchmark their performance more accurately than the current weight based recycling target.

In 2021, the Environment Act 2021 came into law. The Act introduced new powers to meet the waste targets laid out in the *Resources and Waste Strategy* and deliver the Commission's recommended actions. This includes charges for single use plastic, extended producer responsibility to increase recycling through requirements for companies putting packaging on the market to pay for its collection, sorting, and recycling after use, deposit return to incentivise higher quality treatment of municipal waste, and simplified labelling on packaging. The government is also developing waste prevention measures such as bans on certain single use plastic items, and proposals to apply eco design and consumer information requirements for products. These will help deliver a consistent national standard for recycling, restrictions on the use of hard to recycle plastic packaging, and provide incentives to reduce packaging as the Commission recommended.

## Change in infrastructure over the past year

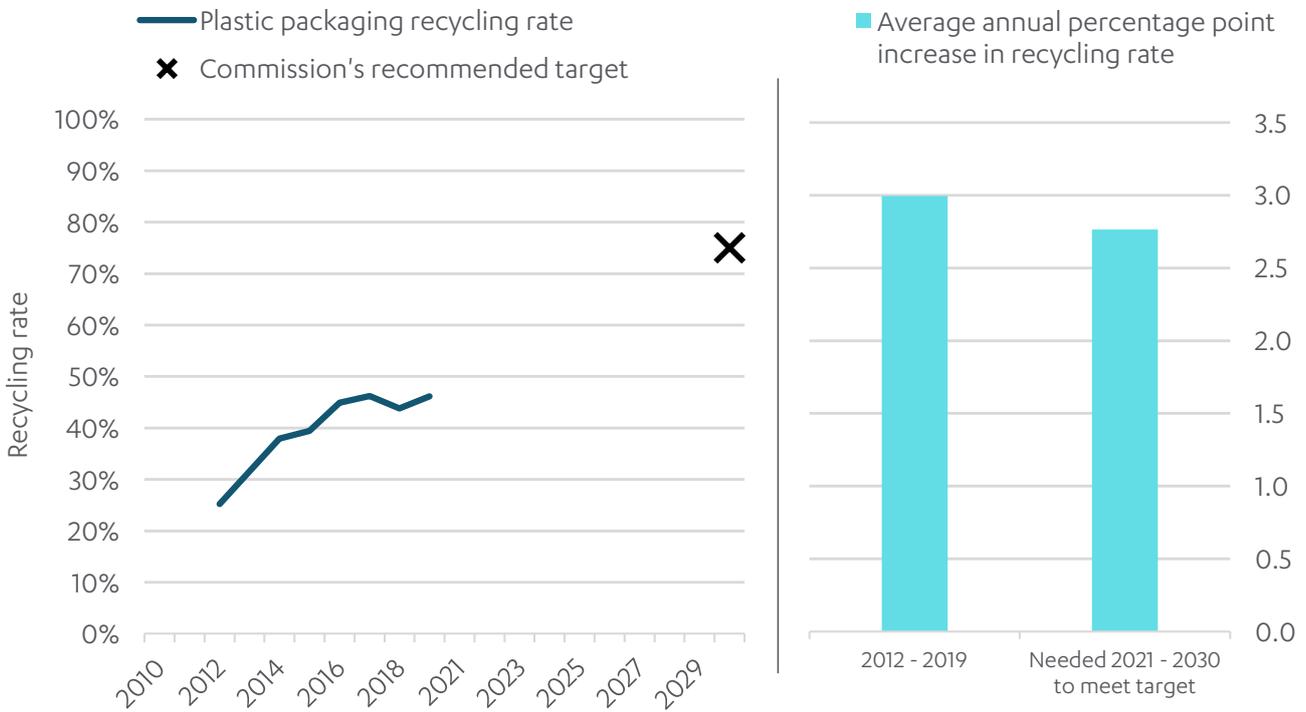
Municipal waste recycling rates have plateaued over the last decade at just above 40 per cent (Figure 11). At the same time, plastic packaging recycling rates have increased significantly (Figure 12). In 2020-21, the municipal recycling rate and plastic packaging recycling rates remained broadly stable at around 42 per cent and 47 per cent respectively.<sup>124</sup> However, it is not clear if this represents a change in infrastructure or is due to disruptions caused by the Covid-19 pandemic. During the pandemic, waste generated by households increased and commercial waste decreased, which may have impacted the overall recycling rates.<sup>125</sup>

**Figure 11: Municipal waste recycling rates need to increase rapidly over the next 15 years**



Source: Department for Environment, Food & Rural Affairs (2021), **ENV18 - Local authority collected waste**. Note: Data from 2020-21 excluded from the chart as it may not represent long term trends given disruption caused by the Covid-19 pandemic.

**Figure 12: Plastic packaging recycling rates need to continue increasing rapidly over the next 10 years**  
*Recycling rates and Commission target in the UK* *Rates of change*



Source: Department for Environment, Food & Rural Affairs (2021), [UK Statistics on Waste](#). Note: Data from 2020 has been excluded from the chart as it may not represent long term trends given disruption caused by the Covid-19 pandemic.

**Assessment of progress**

While government has outlined a strategy for improving England’s recycling sector, more progress across clear goals and plans are needed, for example, establishing a clear target for plastic packaging recycling and firm funding for both municipal and plastic recycling. The municipal waste recycling rate is far too low and has not increased in recent years. Urgent action is needed to address this.

- **Taking a long term perspective: Partly.** The Environment Act 2021 will allow the government to implement further measures to reach the 2035 municipal recycling target. However, there is currently no long term target for plastic packaging.
- **Clear goals and concrete plans to achieve them: Partly.** While the *Resources and Waste Strategy* set a clear target of 65 per cent municipal waste to be recycled by 2035, there is no clear plan to achieve this as policy proposals remain under consultation. Performance indicators for local authorities’ recycling rates are also not in place. Key government consultations on the recommended changes across labelling, single use plastic, recycling consistency and incentives have closed and are awaiting full response.
- **Firm funding commitment: Partly.** The extended producer responsibility outlined in the *Environment Act 2021* will provide funding for collecting, sorting, and recycling packaging. However, these plans remain in the consultation phase and it is unclear how costs will transfer from local authorities to businesses.

- **Genuine commitment to change: Yes.** The *Resources and Waste Strategy* sets out a new vision for waste management in England and demonstrates a genuine commitment to change. But without more detailed planning and firm funding commitments, this will not amount to change on the ground.
- **Action on the ground: No.** Municipal waste recycling rates have plateaued over the last decade and appear well off track of the government's target for 2035 (Figure 11). While plastic packaging data for England does not exist, UK totals indicate a significant gap to the 75 per cent recycling target for 2030 recommended by the Commission (Figure 12).

## Next steps in the second *National Infrastructure Assessment*

**Challenge: Waste and the circular economy** – the Commission will examine the role of the waste sector in enabling the move towards a more circular economy

### Collecting more food waste for anaerobic digestion

#### Commission recommendations

In the first Assessment the Commission recommended that government establish separate food waste collection for households and businesses (to enable production of biogas) by 2025.

#### Government policy

The *National Infrastructure Strategy* fully endorsed this recommendation. Local authorities will own implementation, with the Environment Act 2021 legislating the target date for the establishment of separate food waste collection by 2025.

#### Change in infrastructure over the past year

Since the first Assessment, local authority collected food waste recycling increased from 399 thousand tonnes in 2017-18 to 445 thousand tonnes in 2019-20.<sup>126</sup>

#### Assessment of progress

Government has made good progress in establishing separate food waste collection for households and businesses (to enable production of biogas) by 2025, demonstrating a genuine commitment to change. However, to ensure that all local authorities achieve this, clear plans should now be delivered:

- **Taking a long term perspective: Yes.** The government has accepted the Commission's recommended date of 2025 for establishing food waste collection.
- **Clear goals and concrete plans to achieve them: Partly.** Despite identifying local authorities as the policy implementer and setting a clear deadline, the government has not yet specified whether it will provide national plans on the roll out, or whether the responsibility lies with each individual authority to determine next steps. The government now needs to ensure plans underpin the commitment.
- **Firm funding commitment: Yes.** The *Net Zero Strategy* and the Spending Review 2021 have explicitly committed £295 million capital funding for local authorities to meet the target.

- **Genuine commitment to change: Yes.** The Environment Act 2021 requires all local authorities in England to separately collect household food waste, preventing it from being sent to landfill. This will create carbon savings and support the shift to a circular economy, as food waste is instead turned into biogas and digestate (a soil improver) through anaerobic digestion.
- **Action on the ground: Partly.** Whilst an increasing amount of food waste is being separately collected, this is only a small proportion of total household food waste generated: analysis suggests around 10 per cent of household food waste is currently collected.<sup>127</sup>

# Transport

Constraints on transport infrastructure are holding back many large cities and towns outside London, preventing them from achieving their productivity potential and impacting on quality of life.

Whilst government has made some progress on the Commission's recommendations for the transport sector, longer term certainty and a fundamental change in how funding is allocated. Government must also support the infrastructure necessary to decarbonise the transport sector. Delivery of electric vehicle charge point infrastructure is off track, and more detailed plans are needed for decarbonising freight.

The *Integrated Rail Plan* has provided clarity with a long term plan for rail in the north and midlands to build new high speed lines and upgrade and electrify existing lines. The plan adopted the adaptive approach recommended by the Commission. However, although government remains committed to east west rail links to support the Cambridge-Milton-Keynes-Oxford Arc, further commitment to the Arc remains limited.

Progress on major urban transport upgrades is limited — as yet no long term funding has been committed to transformational upgrades for priority cities. However, government has confirmed plans to devolve more funding to city regions. The next step is to extend this to other local authorities.

The *Transport Decarbonisation Plan* sets out a long term vision for decarbonisation of the freight sector. However, a comprehensive assessment of the infrastructure needed to enable freight heavy goods vehicle decarbonisation is yet to be published.

Government has committed to phasing out new sales of fossil fuel cars and vans by 2030 and has committed significant funding to deliver this. But the roll out of the charge point infrastructure required is too slow, government must urgently act to address this.

## Priority actions for 2022:

To deliver tangible improvements in local transport, government must:

- Move away from competitive bidding for multiple, centrally controlled, short term funding pots and make fast progress towards devolving five year integrated funding settlements for transport spending to local authorities outside the city region combined authorities

- Support local authorities in developing plans for major urban transport schemes in a number of priority cities, including plans to develop a mass transit system for West Yorkshire
- Initiate a step change in the rate of deployment of charge points to get on track to deliver the infrastructure needed to facilitate the 2030 end to new diesel and petrol car and van sales

## The transport sector

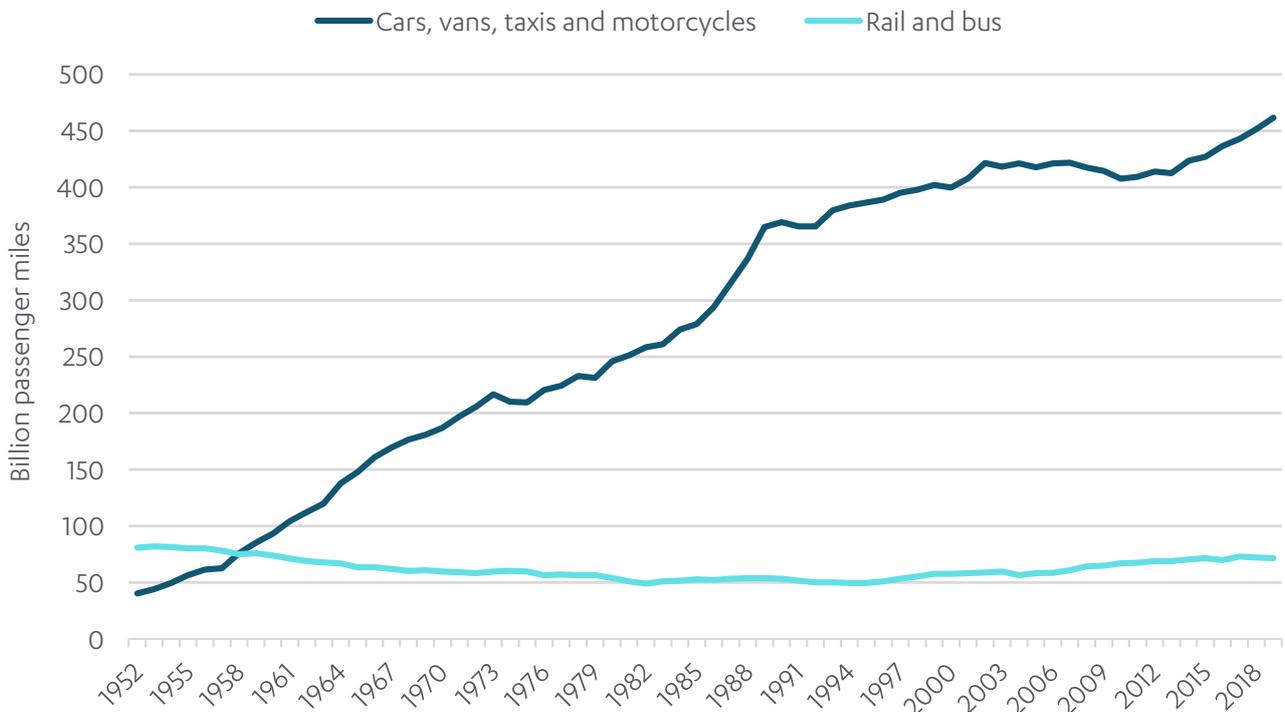
Transport infrastructure connects people, communities, and businesses, and is essential to economic growth, productivity, and quality of life. It includes the roads and rail used by transport, stations used by passengers to access the network, fuelling infrastructure like electric vehicle charging points,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

The 30 years before the Covid 19 pandemic saw overall transport passenger miles and freight mileage 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 Covid 19 pandemic changed travel behaviour dramatically. The extent to which transport patterns will revert to previous trends, or whether changes in behaviour will become permanent, remains unclear.

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

**Figure 13: Transport usage has risen over the past 30 years**

*Passenger miles by mode 1952 - 2019*



Source: Department for Transport 2021, **modal comparisons**. Note: data from 2020 has been excluded from the chart as it may not represent long term trends given disruption caused by the Covid-19 pandemic.

# Progress against the Commission's recommendations

## Urban Transport

### Commission recommendations

In the first *Assessment*, the Commission recommended government commit long term funding in the order of £30 billion between now and 2040 for major urban transport investment. This included locally raised finance and a process to identify a number of priority cities for transformational upgrade programmes, to be developed in partnership with local authorities. The *Assessment* also recommended local leaders in city regions outside London should be given stable, devolved five year infrastructure budgets.<sup>128</sup>

The Commission's study *Towns, Infrastructure and Regeneration* set out two key recommendations to improve the current funding system for local transport:

- Every local transport authority should have a long term infrastructure strategy for the towns in its area, supported by a pipeline of projects. Strategies should be developed locally and collaboratively as part of, or complementary to, distinctive 15 year place based plans to support economic development of towns.<sup>129</sup>
- Government should provide all county and unitary authorities, or combined authorities where they are in place, with devolved five year budgets for transport.<sup>130</sup>

### Government policy

In the *Spending Review 2020*, government committed to five year funding settlements for city regions with metro mayors. These settlements are for maintenance, renewals, smaller upgrades and improvements. Subsequently, the *Spending Review 2021* committed to £5.7 billion for eight English mayoral city regions for 2022-27, to transform local transport networks through London style integrated settlements. The *Spending Review 2021* also committed £5.3 billion funding for local road improvements and maintenance.<sup>131</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 to plan and build a mass transit system for its urban area at an indicative cost of over £2 billion.<sup>132</sup>

In the *Levelling Up White Paper*, government committed to streamlining local growth funding and extending and simplifying devolution. The white paper also made commitments to reducing the number of unnecessary individual funding pots streamlining the bidding process. It extended devolution beyond metropolitan areas and has 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.<sup>133</sup>

### Assessment of progress

Government is yet to make a genuine commitment to change on urban transport. Whilst the steps to widen devolution to more local areas and the prospect of expanding the existing devolution arrangements with city regions are welcome, government must do more to achieve tangible improvements to local infrastructure. Urgent and fundamental reforms will be needed to achieve tangible improvements to local infrastructure by 2030, including developing plans for major urban transport schemes in priority cities. The absence of a longer term pipeline of major urban transport schemes, at greater scale than currently planned, means improvements are likely to be incremental. Outside cities, progress is being made, but too slowly.

Fundamental reform to how local transport funding is allocated is needed, with a shift away from competitive bidding between councils for multiple, centrally controlled, short term funding pots, to long term devolved funding settlements. Establishing new, simplified funding arrangements for places outside cities should be achievable within the next couple of years, rather than taking eight years as the government has set out.

- **Taking a long term perspective: No.** Beyond the West Yorkshire mass transit system, government has no plans for major urban transport schemes in a number of priority cities, with a funding commitment in the order of £30 billion by 2040 including locally raised finance. And whilst the commitment to devolved budgets for city regions is a step in the right direction, there is no legislative framework to enable the current set of five year budgets to be renewed. Unlike strategic transport bodies such as Network Rail and National Highways that are given five year budgets, city regions are unable to rely on future five year settlements to enable long term planning.
- **Clear goals and concrete plans to achieve them: Partly.** The *Levelling Up White Paper* made commitments to streamlining local growth funding and extending and deepening devolution, but these commitments need to be supported by concrete plans and clear interim goals for developing and agreeing the new arrangements as soon as is practicable.
- **Firm funding commitment: Partly.** There are clear funding arrangements in place for city regions for the next five years. But in the long term these will be insufficient for the scale of upgrades needed to achieve transformational change. And places outside major cities will have to wait for various funding pot processes to be completed before they have the certainty they need for effective local transport planning. Establishing new simplified funding arrangements for places outside cities should be achievable much faster than the government target of 2030.
- **Genuine commitment to change: Partly.** The *Levelling Up White Paper* is ambitious in terms of its scope and aims; however, the proposals it sets out are modest steps towards delivering the change that is required. The rate of progress overall is slow, and the lack of action taken to deliver major infrastructure projects suggests a failure to recognise the inadequacy of urban transport in congested cities outside London and the scale of investment needed to overcome this.
- **Action on the ground: Not applicable.** As the devolved budgets for city regions do not start until 2022-23, the Commission cannot yet assess progress on the ground.

## Interurban transport

### Commission recommendations

In the *Rail Needs Assessment* the Commission recommended that government 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 *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:

- **focussing on upgrades** with a baseline budget of £86 billion; consistent with rail spending in 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 focussing on upgrades alone would not meet the strategic objective of levelling up, and that prioritising regional link packages would likely bring higher economic benefits overall for cities in the north and midlands than the long distance link packages.

The Commission also made recommendations on interurban transport in its study *Partnering for Prosperity: A new deal for the Cambridge-Milton Keynes-Oxford Arc*. The central finding from the study was that rates of house building will need to double if the Arc is to reach its economic potential, and that this should be delivered through new housing settlements. To facilitate this, the Commission recommended that government progress work on East West Rail and build the Expressway road connecting Oxford and Cambridge.<sup>134</sup>

### **Government policy**

The Government has now set out a long term plan for rail in the north and midlands through the *Integrated Rail Plan*, which includes a commitment to £96 billion government investment over the period to 2050.<sup>135</sup> The *Integrated Rail Plan* has committed to building three new high speed lines and electrifying or upgrading three existing main lines. It also sets 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 in the *Integrated Rail Plan*, with a core pipeline of investment and options to potentially go further in future.<sup>136</sup>

In the Cambridge-Milton Keynes-Oxford Arc, government has cancelled plans for the Oxford-Cambridge Expressway. It argued that, despite initial commitments, further work found that it was not possible to deliver the scheme and its benefits at a reasonable cost.<sup>137</sup> However, government does remain committed to the east west rail link. Government committed £760 million in 2021 to deliver the Bicester to Bletchley section of connection stage one.<sup>138</sup> Government has begun the process of creating a spatial framework to be published in 2022, which will help develop a strategic vision for the arc and facilitate the successful deployment of the east west rail link.<sup>139</sup>

### **Change in infrastructure over the past year**

The East West Rail project will be delivered in the 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 currently 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>140, 141</sup>

### **Assessment of progress**

The *Integrated Rail Plan* is a concrete plan to deliver major long-term investments to improve rail for the north and midlands in the face of public spending constraints and demonstrates a genuine commitment to change on interurban transport. However, progress is less positive on the Cambridge-Milton Keynes-Oxford growth Arc.

- **Taking a long term perspective: Yes.** The *Integrated Rail Plan* considered the next 30 years and *The Spatial Framework* for the Cambridge-Milton Keynes-Oxford Growth Arc is an important step and is needed to provide certainty to stakeholders on the direction of the Arc's development.
- **Clear goals and concrete plans to achieve them: Yes.** 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 to be achieved. The plan for the Arc is less clear. East West Rail presents a major growth opportunity for the arc and government must continue with all phases of the delivery plan.
- **Firm funding commitment: Yes.** Significant funding has been allocated through the *Integrated Rail Plan* for the North and the Midlands and to East-West Rail; however, government is yet to commit to funding the full route.
- **Genuine commitment to change: Yes.** The *Integrated Rail Plan* sets out the ambition to level up opportunity across the country and transform connectivity and is the largest public investment in Britain's rail network.
- **Action on the ground: Not applicable.** As the *Integrated Rail Plan* has only recently been published, there is not yet any change in infrastructure for the Commission to assess.

## Freight

### Commission recommendations

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 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.<sup>142</sup>

### Government policy

In July 2021, government published the *Transport Decarbonisation Plan*. This set out how government will deliver the emissions reductions needed from the transport sector to meet the net zero target.<sup>143</sup> Subsequently, government committed to phasing out new, non-zero emission heavy goods vehicles weighing 26 tonnes and under by 2035 and all new heavy goods vehicles by 2040.<sup>144</sup> *The Integrated Rail Plan* also set out the ambition to accelerate the modal shift of goods from road to rail by increasing the capacity and capability of freight railways.<sup>145</sup>

Government established a Freight Council in 2021 which meets on a quarterly basis to co-develop the long term strategic plan for the freight sector.<sup>146</sup> Additionally, government announced in November 2021 that they had published planning practice guidance for local planning authorities.<sup>147</sup>

## Assessment of progress

The government has set out long term goals for the freight sector, and the *Transport Decarbonisation Plan* makes clear commitments to decarbonise the sector in line with the Commission's recommendations. However, government still lacks clear plans on how these ambitions will be delivered.

- **A long term perspective: Yes.** 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.
- **Clear goals and concrete plans to achieve them: Partly.** Whilst the *Transport Decarbonisation Plan* sets out ambitious targets, it is less clear on the delivery mechanisms to achieve them, particularly on the difficult question of how rail freight can be decarbonised. Government's forthcoming strategy *Future of Freight* must address the need for a comprehensive assessment of the infrastructure needed to enable freight heavy goods vehicles decarbonisation, including working with Ofgem and distribution network operators to plan any necessary infrastructure upgrades.
- **Firm funding commitment: Not applicable.** The Commission has not made specific recommendations on funding needed to decarbonise freight. However, costs will be significant, so government will need a clear plan for how this will be funded.
- **Genuine commitment to change: Partly.** The establishment of the Freight Council shows commitment to a cross modal approach to freight and government's long term commitments to decarbonisation demonstrate a willingness to change the freight sector. But a lack of detailed delivery plans partly undermines this commitment.
- **Action on the ground: Not Applicable.** Given the timeline set out in the Commission recommendations, not action on the ground is yet expected.

## EV Charging Infrastructure

### Commission recommendations

In the *National Infrastructure Assessment*, the Commission recommended that government, Ofgem and local authorities should enable the roll out 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 are able to 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.

In *Infrastructure, Towns and Regeneration* the Commission highlighted the challenge of providing on street charge points in some towns and cities.

The Commission recommended that government should publish the electric vehicle charging infrastructure strategy, without further delay, followed by a 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.<sup>148</sup>

### **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>149</sup> To support this, government has:

- published a 2035 delivery plan which sets out a pathway to transitioning to zero emission cars and vans. This includes an overview of the investment needed, a set of key milestones and a framework for how progress will be monitored.<sup>150</sup>
- committed £620 million for public charging in residential areas and targeted plug-in vehicle grants. This is in addition to the £1.9 billion committed in the *Spending Review 2020* for charging infrastructure and vehicle grants.<sup>151</sup>
- announced that all electric vehicle charging stations will be required in new homes and businesses, or those undergoing major renovation, in the UK from 2022.

Ofgem have also set out their ambition to support the transition to electric vehicles in *Enabling the transition to electric vehicles*.<sup>152</sup> Ofgem set out three primary actions of relevance to the Commission's recommendations:

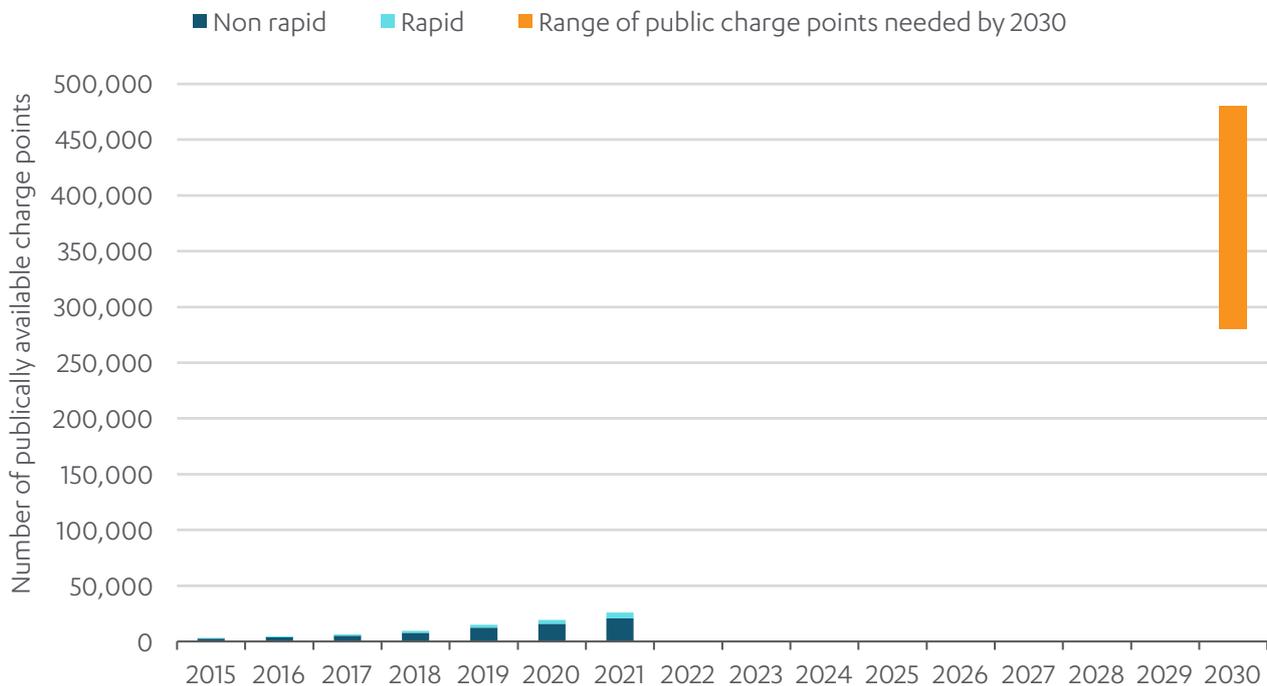
- ensuring the electricity network is ready to support electric vehicles by facilitating investment where needed
- reducing charge point connection charges for some customers by spreading these more fairly over a wider consumer base and over time, through ongoing use of system charges
- supporting deployment of smart charging by improving price signals for flexible network use, and working with the Department for Business, Energy and Industrial Strategy to consider charge point interoperability and technical guidance.<sup>153</sup>

### **Change in infrastructure over the past year**

Deployment of infrastructure charge points has been increasing in recent years as the market delivers. There are now over 28,000 publicly available charge points across the country, of which around 5,000 are rapid charge points.<sup>154</sup> However, there is not yet a visible core network of rapid chargers.

There is also significant regional disparity in availability of public charge points with more provision in densely populated areas than in rural areas.<sup>155</sup> This is also true for on street charge points where, in 2021, there were only 1,000 on street charge points outside of London.<sup>156</sup> Currently over eight million households do not have access to a drive or garage to install a charge point and will require access to locally available public charge points.<sup>157</sup>

**Figure 14: Public charge points are being deployed at pace, but there is a long way to go**  
*Electric vehicle charge point deployment 2015 – 2021 and estimate of required volume by 2030*



Source: Department for Transport (2022), [Electric vehicle charging device statistics: January 2022](#) and Competition & Markets Authority (2021), [Electric vehicle charging market study: final report](#).

### Assessment of progress

Government has demonstrated a genuine commitment to change with its target for 100 per cent electric new car and van sales by 2030. It has supported this with significant funding. But it does not yet have robust delivery plans and deployment of charging infrastructure is significantly behind where it needs to be. There is not yet a visible core network of rapid chargers across the country, and significantly more publicly available charge points, including on street charge points, will be needed by 2030. Without this, drivers will not have the confidence to make the switch to electric vehicles.

- **Taking a long term perspective: Yes.** Government’s target for 100 per cent new electric car and van sales by 2030 clearly shows it is thinking beyond the next few years.
- **Clear goals and concrete plans to achieve them: No.** Despite positive high level commitments government does not yet have a comprehensive plan for how the needed electric vehicle charging infrastructure will be delivered. Such a plan must be published without delay, and include specific consideration of how electric vehicle charge points will be rolled out in towns.
- **Firm funding commitment: Yes.** Government commitments in recent spending reviews showed a clear funding commitment to support the uptake of electric vehicles and deployment of charging infrastructure.
- **Genuine commitment to change: Yes.** By setting a 2030 deadline for the sale of new fossil fuelled cars and vans, government has demonstrated a clear willingness to fundamentally change road transport in the UK.

- **Action on the ground: No.** Delivery of charge points from the market has increased significantly in recent years, although still has a long way to go. However, government has made limited progress on deploying a visible core network of rapid chargers to give drivers the confidence they need to switch to an electric vehicle. And provision of on street charge points outside of London remains low.

# Cross cutting issues

## Priority actions for 2022:

- Building on the publication of the *Economic Regulation Paper* to complete a review of regulators' statutory duties
- Set out improvements to resilience standards and stress testing in the *National Resilience Strategy*

## Resilience

### Background

Resilience is a core characteristic of good infrastructure, ensuring that systems provide the services the UK 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 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>158</sup>

The UK's economic infrastructure has, for the most part, proved fairly resilient over recent years. Disruptions and failures have generally led to moderate impacts, rather than extreme or catastrophic ones. The public has largely been able to cope with disruptions to digital, road and rail infrastructure, and few disruptions have led to prolonged or widespread loss of energy or water.

However, complacency that infrastructure will be resilient to future challenges must be avoided and not every shock can be prevented. The aftermath of Storm Arwen in November and December 2021 showed the impact that a prolonged loss of service can have and the importance of being able to recover quickly from extreme events, as well as resisting or absorbing their impacts. And while infrastructure generally coped well, the Covid-19 pandemic has shown that significant, high impact disruptions can and do happen. Maintaining resilience requires a proactive approach, facing up to the possibility of different or harder challenges in the future – such as an increase in extreme weather events.

Adaptation and resilience were key themes for discussion at COP26 alongside emissions reduction. Ensuring that resilience and security of supply are maintained will be critical to a successful transition to net zero in 2050. The Commission will provide advice to government on these key areas 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 detail on the resilience recommendations can be found in the full report **Anticipate, React, Recover: Resilient infrastructure systems**.

### **Government policy**

Since the last *Annual Monitoring Report*, government policy on cross cutting resilience issues has developed in two key areas.

In September 2021, government published its official response to the Resilience Study.<sup>159</sup> This accepted, in principle, the Commission’s recommendations on standards and stress testing, with the outcome of the *National Resilience Strategy* influencing how government will take these recommendations forward. It did not include a response to the recommendation on operators’ resilience strategies. However, it noted that “cross-cutting requirements of CNI and other infrastructure operators will be determined following the National Resilience Strategy”.

The commitment to produce a *National Resilience Strategy* was the other key development. This was announced in March 2021, as part of *Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy*.<sup>160</sup> The strategy is expected to be published in 2022.

The approach to the strategy described in the integrated review reflects a number of issues raised by the Commission in the Resilience Study. This includes planning to take an ‘all hazards’ approach – looking at resilience in the round, rather than at individual risks – and the importance of making better use of data and analysis. In doing so, the strategy will cover the resilience of sectors across society and the economy including, but not limited to, those within the Commission’s remit.

### **Assessment of progress**

There have been good signs of progress on resilience over the last year. Government’s acceptance of the Commission’s resilience recommendations and plans for a National Resilience Strategy are welcome developments that demonstrate a recognition of the importance of resilience. There has also been progress on some key resilience challenges, such as publication of the *National Cyber Strategy* in February 2022.<sup>161</sup>

The key next step will be publication of the National Resilience Strategy later this year. The strategy needs to demonstrate the government’s ambition and signal a clear direction of travel to both industry and the public.

- **A long term perspective: Yes.** The 2030 focus for the *National Resilience Strategy*, means government is focussing beyond the UK’s immediate, short term resilience needs.
- **Clear goals and concrete plans to achieve them: Partly.** Accepting the Commission’s recommendations on standards and stress testing has provided two clear goals, but the *National Resilience Strategy* needs to set government’s broader objectives for resilience. It also needs to include an explanation of how these ambitions will be delivered.

- **Firm funding commitment: Partly.** There are positive signs on investment, with resilience featuring in the new Strategic Policy Statement to Ofwat and in draft business plans for the next RIIO price control. For ambitions included in the *National Resilience Strategy* to be meaningful, they will need to have both the required government resources for delivery and set a clear direction so that infrastructure users and operators can make appropriate choices and investments.
- **Genuine commitment to change: Partly.** There are indications that government is committed to a more effective approach to resilience. The *National Resilience Strategy* will need to ensure that it balances strategic direction with deliverables that show how the strategy will be implemented.
- **Action on the ground: Not applicable.** Some 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.

## Next steps in the second *National Infrastructure Assessment*

**Challenge: Asset management and resilience** – the Commission will consider how asset management can support resilience, barriers to investment, and the use of data and technology to improve the way assets are maintained

## Regulation

### Background

Since privatisation, the current regulatory system has attracted significant private sector investment and improved outcomes for the public. However, the system was designed for different times. There is now a twin challenge of reaching net zero and adapting to the impact of climate change. Regulation must facilitate the changes required to deliver on these challenges.

Regulation has a role to play in maintaining public trust in the infrastructure systems relied on, including assessing how the costs of infrastructure flow through to consumers' energy bills. This investment will ultimately need to be funded by either consumers (via bills), or taxpayers. The Commission will consider funding challenges in the second *Assessment*, including the overall affordability of required investment, the distribution of costs and savings across groups in society, and who should pay.

### Commission recommendations

With the twin challenges of reaching net zero and adapting to the impacts of climate change, long term strategic investment is crucial. Regulators need to be empowered by government to approve long term, high quality, strategic investment. In *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
- 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.

## Government policy

In 2022 government published a policy paper focused on updating the framework for economic infrastructure regulation.<sup>162</sup> It included commitments that aligned with 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 further consultation on related issues is planned for 2022, including commitments to update the appeals framework, facilitate greater competition and enhance the consumer experience and outcomes.

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.<sup>163, 164</sup> However, there is 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>165</sup> Government has now committed to consulting on it in 2022.<sup>166</sup> In January 2022 government also published an open letter to regulators setting out new regulatory principles and outlining strategic priorities for the utility sectors, designed to complement sector specific guidance.<sup>167</sup> The planned consultation will consider whether further cross sectoral strategic guidance should be made statutory, meaning regulators must have regard to it.<sup>168</sup>

Government has likewise made some steps toward increasing competition. This includes work on increasing competition in onshore electricity networks and – as part of its 2022 policy paper – asking Ofwat to produce a review of competition for the provision of infrastructure in its sector.<sup>169</sup>

## Assessment of progress

It has now been over two 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:

- **A long term perspective: Partly.** Government is committed to a long term approach that provides investors with stability. However, government guidance on strategic direction over previous years has been infrequent or missing. Government must deliver on its commitment in the 2022 policy paper to consult on a strategic policy statement for Ofgem this year. Cross sectoral guidance in the form of an open letter, as 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: Partly.** Government has not yet reached final decisions on the key recommendations made by the Commission, set out above. The policy paper published in January 2022 sets out a process of further reviews and consultations.
- **Firm funding commitment: Not applicable.** The Commission did not make recommendations on the funding of regulators. Funding and financing of economic infrastructure is discussed below.
- **Genuine commitment to change: Partly.** Government's recent policy paper showed that it understood 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.

- **Action 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.

## 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 can overrun, and assets can fail or require early replacement. That is why it is crucial that good design is embedded in the culture of infrastructure planning.

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. To deliver this, 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.

Over the past year, the Infrastructure and Projects Authority has been delivering on these requirements. Since May 2021, the Infrastructure and Projects Authority's delivery support and assurance regime requires that projects fully consider the Commission's design principles, and embeds them into their outcomes, plans and delivery, which are regularly monitored and reviewed as part of the Infrastructure and Projects Authority's assurance processes. The Infrastructure and Projects Authority has also requested that selected infrastructure projects from its major projects portfolio consider piloting board level design champions, with support from the Design Group.

### **Assessment of progress**

Government has demonstrated a genuine commitment to increasing the design quality of the country's infrastructure. The National Infrastructure Strategy set clear goals and a deadline for embedding the Commission's design recommendations into infrastructure planning policy. The Infrastructure and Projects Authority is now delivering on these goals. Incorporating design as a key indicator in assurance reviews provides a clear commitment to embedding design in the culture of infrastructure planning. Board level design champions, supported by design panels, will now be crucial to making this happen. Positive progress has been made with the Infrastructure and Projects Authority recently requesting that selected projects consider appointing design champions. It is critical that this leads quickly to appointments that can kickstart the vital task of delivering better design on the ground.

## **Data**

### **Background**

Having more information or data about infrastructure assets enables them to be used more productively. Knowing where all the country's infrastructure is and how it is being used will help decision makers and operators to plan and maintain these crucial national systems better. But simply having the data is not enough. It needs to be shared across the public and private sectors with the appropriate levels of secure access to enable its value to be fully leveraged for public benefit. The UK can get more out of existing infrastructure through the judicious use of sensors, data and machine learning, and by sharing the resulting insights in an appropriate way.

### **Commission recommendations**

In *Data for the public good*, the Commission highlighted the value of data in infrastructure and set out a roadmap towards a National Digital Twin to improve monitoring and management of the UK's infrastructure.

### **Government policy**

In the *National Infrastructure Strategy* government committed to developing a national digital twin; an ecosystem of connected digital twins. The national digital twin programme has been progressed by the Centre for Digital Built Britain, a partnership between the Department for Business Energy and Industrial Strategy and Cambridge University. It has:

- set out a roadmap to enable the development of the National Digital Twin in 2019
- published the Pathway to the Information Management Framework in 2020
- successfully completed the Climate Resilience Demonstrator project (CreDo); which is a climate adaptation digital twin and to illustrate the value of sharing data across sectors

- set up the Digital Twin Hub, a collaboration between over 3,500 members to progress the connected national digital twin
- in combination with the Centre for the Protection of National Infrastructure progressed the development of an information management framework.

### Assessment of progress

Good progress has been made by the Centre for Digital Built Britain and others in developing the national digital twin programme. However, funding for the Centre has now expired. There is therefore no clear single owner or coordination for connected national the national digital twin and the Commission's associated recommendations. Government should rectify this, as without it, there is a significant risk that progress on this important programme stalls.

As digital twins start to become more widely used, continued public funding is required to ensure the full public benefits of secure data sharing are achieved as originally envisaged in *Data for the public good*. Government should commit funding to this at the earliest opportunity.

## 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'). A high proportion of UK infrastructure is financed by the private sector and the majority of infrastructure financed through the private sector is funded through consumer bills.<sup>170</sup>

### Commission recommendations

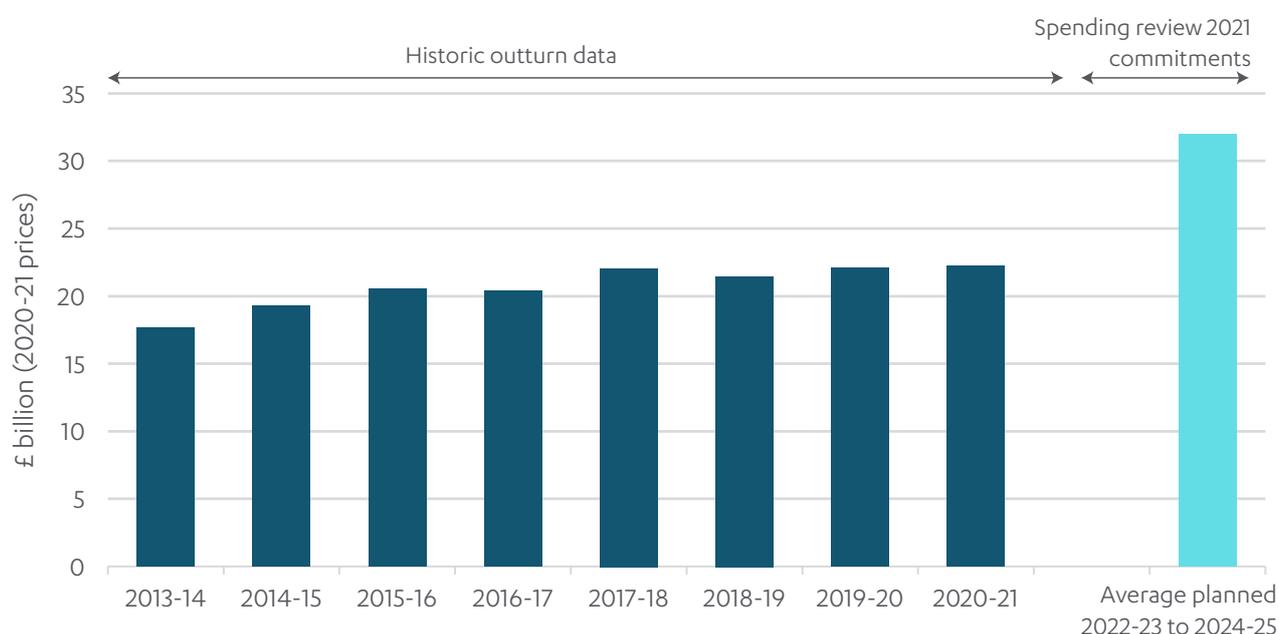
The Commission recommended that government should deliver long term certainty over infrastructure funding and set out its recommended funding profile in the *National Infrastructure Assessment*. On infrastructure finance, the Commission recommended that government establish a new operationally independent infrastructure finance institution, designed around three key building blocks: sound banking, additionality, and economic and social impact.

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. Much of the multi-year capital programme settlements for economic infrastructure was already set out in Spending Review 2020.<sup>171</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>172</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>173</sup>

**Figure 15: Government has committed to increasing public spending on economic infrastructure***Public expenditure on economic infrastructure*

Source: Commission calculations, HM Treasury 2021, **Spending Review 2021**. Note: the profile of the £100 billion spending commitment on economic infrastructure from Spending Review 2021 between 2022-23 and 2024-25 has been assumed flat in percentage of GDP terms. Data for 2021-22 not yet available.

The UK Infrastructure Bank was established in June 2021. The Bank has £12 billion initial of capital to deploy and can issue up to £10 billion of guarantees.<sup>174</sup> It has two strategic objectives: to help tackle climate change and support regional and local economic growth.<sup>175</sup> In June 2022, it will publish its first Strategic Plan and in January 2022, it published a discussion paper on this strategic plan.<sup>176</sup> The UK Infrastructure Bank is also developing an expert advisory service to help local authorities, and other project sponsors, to develop and finance projects. By March 2022, it has already agreed three deals.

### 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. Provided that this allocated funded is spent, government funding over the spending review period will be a significant increase on recent years (Figure 15). Moreover, government's increase in the fiscal remit signals a long term commitment to potentially increasing public expenditure on economic infrastructure and underlines a genuine commitment to change. This expenditure will now need to be realised through effective execution and delivery of a range of infrastructure projects.

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 difference with three deals made by March 2022. However the UK Infrastructure Bank alone is not intended to be the magic bullet for financing UK infrastructure. Its £12 billion in capital and £10 billion guarantees only makes up a small proportion of the overall financing needed. In addition to the establishment of the UK Infrastructure Bank, across all economic infrastructure sectors, clear policy and a stable regulatory environment is needed to mobilise the significant volumes of private financing needed to deliver the Commission's recommendations.

## Endnotes

- 1 National Infrastructure Commission (2021), **Annex A: Digital**
- 2 Ofcom (2021), **Connected Nations 2021**; the definition of outage or disruption can be found in Ofcom (2017) Ofcom guidance on security requirements in sections 105A to D of the Communications Act 2003
- 3 Ofcom (2021), **Connected Nations 2021** and National Infrastructure Commission (2021), **Annex A: Digital**
- 4 Which? (2021), **Major broadband providers not up to speed during pandemic, Which? reveals**
- 5 National Infrastructure Commission (2018), **The National Infrastructure Assessment**
- 6 National Infrastructure Commission (2021), **Infrastructure, Towns and Regeneration**
- 7 HM Treasury (2020), **National Infrastructure Strategy**
- 8 HM Government (2021), **Levelling up the United Kingdom: Missions and Metrics Technical Annex**
- 9 Department for Digital, Culture, Media & Sport (2021), **Project Gigabit Delivery Plan Autumn Update**
- 10 Ofcom (2021), **Promoting investment and competition in fibre networks – Wholesale Fixed Telecoms Market Review 2021-26**
- 11 Ofcom (2021), **Promoting investment and competition in fibre networks – Wholesale Fixed Telecoms Market Review 2021-26**
- 12 Ofcom (2021), **Promoting competition and investment in fibre networks: Wholesale Fixed Telecoms Market Review 2021-26 Volume 4: Pricing remedies**
- 13 Openreach (June 2021), **Openreach adds 551 more locations to its full fibre broadband plan as the build reaches five million homes and counting**; Openreach (2021), **Openreach focuses broadband build plans on upgrading millions more rural homes**
- 14 Department for Digital, Culture, Media & Sport (2021), **Project Gigabit Delivery Plan Autumn Update**
- 15 Department for Digital, Culture, Media & Sport (2021), **Project Gigabit Delivery Plan Autumn Update**
- 16 Ofcom (2021), **Connected Nations 2021**
- 17 ‘Total not spots’, where no Mobile Network Operators is providing 4G coverage, and ‘partial not spots’, where service is available from one Mobile Network Operator but not others
- 18 Department for Digital, Culture, Media & Sport (2020), **Shared rural network**
- 19 Department for Digital, Culture, Media & Sport (2021), **Government breakthrough on £500 million support package to boost rural mobile coverage**
- 20 Department for Digital, Culture, Media & Sport (2018), **Future Telecoms Infrastructure Review**; Department for Levelling up, Housing & Communities (2022), **Levelling Up the United Kingdom**
- 21 Department for Digital, Culture, Media & Sport (2021), **Wireless Infrastructure Strategy: Call for Evidence**
- 22 Department for Digital, Culture, Media & Sport (2021), **5G Testbeds and Trials Programme**
- 23 Ofcom (2021), **Connected Nations 2021** p.41
- 24 Ofcom (2021), **Connected Nations 2021**
- 25 Ofcom (2021), **Connected Nations 2021**
- 26 Ofcom (2021), **Connected Nations 2021**
- 27 Ofcom (2021), **Connected Nations 2021**
- 28 Ofcom (2021), **Connected Nations 2021**
- 29 Ofcom (2021), **Connected Nations 2021**
- 30 Department for Business, Energy & Industrial Strategy and Ofgem (2022), **Russia-Ukraine and UK energy: Factsheet**
- 31 Department for Business, Energy & Industrial Strategy (2021), **Digest of UK Energy Statistics (DUKES): electricity**
- 32 Ofgem (2021), **Review of GB energy system operation**
- 33 National Infrastructure Commission (2020), **Renewables, Recovery and Reaching Net Zero**
- 34 National Infrastructure Commission (2016), **Smart Power**
- 35 National Infrastructure Commission (2021), **Advice note on nuclear power plant deployment**
- 36 HM Treasury (2020), **Response to the National Infrastructure Assessment** p.10
- 37 HM Government (2020), **The Ten Point Plan for a Green Industrial Revolution**; National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 38 Department for Business, Energy & Industrial Strategy and Ofgem (2022), **Government hits accelerator on low-cost renewable power**
- 39 HM Government (2021), **Net Zero Strategy: Build Back Greener** p.94
- 40 Department for Business, Energy & Industrial Strategy and Ofgem (2021), **Transitioning to a net zero energy system: smart systems and flexibility plan 2021** p.5-6; Department for Business, Energy & Industrial Strategy (2020), **Energy white paper: Powering our net zero future** p.80
- 41 Department for Business, Energy & Industrial Strategy (2021), **New finance model to cut cost of new nuclear power stations**
- 42 Department for Business, Energy & Industrial Strategy (2021), **Digest of UK Energy Statistics (DUKES): electricity**
- 43 Ofgem (2021), **Interconnectors**; Department for Business, Energy & Industrial Strategy and Ofgem (2021), **Transitioning to a net zero energy system: smart systems and flexibility plan 2021** p.21, 40
- 44 Department for Business, Energy & Industrial Strategy (2021), **Energy Trends: UK renewables Renewable electricity capacity and generation (ET 6.1 – quarterly)**; Climate Change Committee (2020), **The Sixth Carbon Budget Electricity generation** p.26
- 45 Department for Business, Energy & Industrial Strategy (2021), **Facilitating the deployment of large-scale and long-duration electricity storage: call for evidence**
- 46 Department for Business, Energy & Industrial Strategy (2021), **Contracts for Difference (CfD) Allocation Round 4: Draft budget notice**
- 47 HM Government (2021), **Heat and Buildings Strategy**
- 48 Department for Business, Energy & Industrial Strategy (2022), **Boiler upgrade scheme: final impact assessment (publishing.service.gov.uk)**

- 49 Department for Business, Energy & Industrial Strategy (2021), **A market based mechanism for low carbon heat**
- 50 Department for Business, Energy & Industrial Strategy (2021), **Heat and Buildings Strategy** p.162
- 51 Department for Business, Energy & Industrial Strategy (2021), **Consultation on a market-based mechanism for low-carbon heat (publishing.service.gov.uk)**
- 52 Department for Business, Energy & Industrial Strategy (2021), **Heat and Buildings Strategy**
- 53 HM Treasury (2020), **Response to the National Infrastructure Assessment**
- 54 Department for Business, Energy & Industrial Strategy (2017), **Clean Growth Strategy** p.77
- 55 Department for Business, Energy & Industrial Strategy (2021), **Government boosts energy efficiency spending to £1.3 billion with extra funding for green homes**
- 56 Department for Business, Energy & Industrial Strategy (2022), **Social Housing Decarbonisation Fund Wave 1: successful bids**
- 57 Department for Business, Energy & Industrial Strategy (2021), **Plan to drive down the cost of clean heat**
- 58 Ofgem (2021), **Case study (UK): Hydrogen-heated homes of the future**
- 59 Climate Change Committee (2021), **Progress in reducing emissions: 2021 Report to Parliament**
- 60 Department for Levelling Up, Housing & Communities (2021), **English Housing Survey data on energy performance, Table DA7101**
- 61 HM Treasury (2020), **Response to the National Infrastructure Assessment**; Department for Business, Energy & Industrial Strategy (2021), **Introducing a performance-based policy framework in large commercial and industrial buildings**
- 62 Climate Change Committee (2021), **Independent Assessment: The UK's Net Zero Strategy**; Climate Change Committee (2022), **Independent Assessment: The UK's Heat and Buildings Strategy**
- 63 National Infrastructure Commission (2021), **Greenhouse gas removal technologies**
- 64 HM Government (2021), **Net Zero Strategy: Build Back Greener**
- 65 Department for Business, Energy & Industrial Strategy (2021), **Greenhouse gas removals call for evidence: summary of responses and next steps** p.9
- 66 Department for Business, Energy & Industrial Strategy (2020), **Projects selected for Phase 1 of the Direct air capture and greenhouse gas removal programme**; Department for Business, Energy & Industrial Strategy (2021), **Direct Air Capture and other Greenhouse Gas Removal technologies competition**
- 67 HM Government (2021), **Net Zero Strategy: Build Back Greener** p.28
- 68 In a written statement to the House Greg Hands provided an update on the UK's CCUS Cluster Sequencing Process (**HC Deb 19 October 2021, c 325WS**).
- 69 Department for Business, Energy & Industrial Strategy (2021), **Greenhouse gas removals call for evidence: summary of responses and next steps**
- 70 Environment Agency (2020), **National Flood and Coastal Erosion Risk Management Strategy for England**
- 71 National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 72 Environment Agency (2020), **National Flood and Coastal Erosion Risk Management Strategy for England**
- 73 Environment Agency (2021), **Flood and coastal erosion risk management report: 1 April 2019 to 31 March 2020**
- 74 Environment Agency (2021), **Flood and coastal erosion risk management report: 1 April 2019 to 31 March 2020**
- 75 National Infrastructure Commission (2021), **The Second National Infrastructure Assessment: Baseline Report Annex C: Flood Resilience**
- 76 National Infrastructure Commission (2021), **The Second National Infrastructure Assessment: Baseline Report Annex C: Flood Resilience**
- 77 National Infrastructure Commission (2021), **The Second National Infrastructure Assessment: Baseline Report Annex C: Flood Resilience**
- 78 Environment Agency (2020), **National Flood and Coastal Erosion Risk Management Strategy for England**
- 79 Environment Agency (2021), **Flood and Coastal Erosion Risk Management Strategy Action Plan 2021**
- 80 National Audit Office (2020), **Managing Flood Risk**
- 81 National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 82 National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 83 HM Government (2020), **Flood and coastal erosion risk management: Policy Statement**
- 84 Department for Environment, Food & Rural Affairs (2020), **Letter to Sir John Armitt**
- 85 Environment Agency (2021), **Measuring resilience to flooding and coastal change**
- 86 Department for Environment, Food & Rural Affairs (2021), **Flood and coastal erosion risk management: An investment plan for 2021 to 2027**
- 87 Department for Environment, Food & Rural Affairs (2021), **Local factors in managing flood and coastal erosion risk and property flood resilience: summary of responses**
- 88 Environment Agency (2021), **Programme of flood and coastal erosion risk management (FCERM) schemes**
- 89 Department for Environment, Food & Rural Affairs, Environment Agency, Ministry of Housing, Communities & Local Government (2021), **More than 1,000 flood schemes to benefit from record investment**
- 90 Department for Environment, Food & Rural Affairs, Ministry of Housing, Communities & Local Government, Environment Agency (2021), **Review of policy for development in areas at flood risk**
- 91 Department for Environment, Food & Rural Affairs (2021), **Flood and coastal erosion risk management policy statement: progress update 2021**
- 92 Department for Environment, Food & Rural Affairs, Environment Agency, Ministry of Housing, Communities & Local Government (2021), **More than 1,000 flood schemes to benefit from record investment**
- 93 Drinking Water Inspectorate (2021), **Drinking Water 2020**

- 94 Commission analysis based on: Consumer Council for Water (2017), **Data Appendices – Water resilience**; Consumer Council for Water (2020), **Water, water everywhere? Water & wastewater resilience report 2019/20**
- 95 National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 96 National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 97 National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 98 National Infrastructure Commission (2021), **The Second National Infrastructure Assessment: Baseline Report**
- 99 National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 100 National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 101 Jean Spencer (2022), **Outcomes from reconciliation and emerging themes**
- 102 HM Treasury (2020), **National Infrastructure Strategy**
- 103 Department for Environment, Food & Rural Affairs (2022), **February 2022: The government’s strategic priorities for Ofwat**
- 104 Ofwat (2019), **PR19 final determinations: Policy summary**
- 105 Ofwat (2019), **A RAPID response to boost water resources resilience**
- 106 Ofwat (2019), **PR19 final determinations: Overview of companies’ final determinations**
- 107 Water UK (2018), **Letter to the Secretary of State**
- 108 Department for Environment, Food & Rural Affairs (2021), **New water saving measures to safeguard supplies**
- 109 Department for Environment, Food & Rural Affairs (2022), **February 2022: The government’s strategic priorities for Ofwat**
- 110 Water Resources South East (2022), **Futureproofing our water supplies: a consultation on our emerging regional plan for South East England**
- 111 Water Resources East (2022), **The Emerging Water Resources Regional Plan for Eastern England**
- 112 Portsmouth Water (2021), **A new reservoir in the South East**
- 113 Havant Borough Council (2021), **Havant Thicket Reservoir given planning permission**
- 114 Commission analysis based on: Consumer Council for Water (2020), **Water, water everywhere? Water & wastewater resilience report 2019/20**; Consumer Council for Water (2021), **CCW 2020-21 Company Performance Data Appendices**
- 115 Commission analysis based on: Consumer Council for Water (2020), **Water, water everywhere? Water & wastewater resilience report 2019/20**; Consumer Council for Water (2021), **CCW 2020-21 Company Performance Data Appendices**
- 116 National Infrastructure Commission (2021), **Behaviour change and infrastructure beyond Covid-19**
- 117 Ofwat (2020), **The RAPID gated process**
- 118 National Infrastructure Commission (2021), **The Second National Infrastructure Assessment: Baseline Report Annex E: Waste**
- 119 National Infrastructure Commission (2021), **The Second National Infrastructure Assessment: Baseline Report Annex E: Waste**
- 120 National Infrastructure Commission (2021), **The Second National Infrastructure Assessment: Baseline Report Annex E: Waste**
- 121 The Commission has compiled waste emissions figures by removing wastewater from totals and adding in energy from waste emissions. Department for Business, Energy & Industrial Strategy (2021), **2019 UK greenhouse gas emissions: final figures – data tables**; Department for Business, Energy & Industrial Strategy (2021), **2019 UK greenhouse gas emissions by Standard Industrial Classification**
- 122 National Infrastructure Commission (2018); **National Infrastructure Assessment**
- 123 Department for Environment, Food & Rural Affairs (2018), **Resources and waste strategy for England**
- 124 Department for Environment, Food & Rural Affairs (2021), **ENV18 - Local authority collected waste: annual results tables**
- 125 National Infrastructure Commission (2021), **Behaviour change and infrastructure beyond Covid-19**
- 126 Department for Environment, Food & Rural Affairs (2021), **ENV18 - Local authority collected waste: annual results tables**
- 127 WRAP analysis suggests that in 2017, total household food waste arisings were 4.4 million tonnes. The Department for Environment, Food & Rural Affairs’ 2019-20 data that indicates 445 thousand tonnes of local authority separately collected food waste from households. This implies around 10 per cent of total food waste arisings are separately collected. WRAP (2020), **National municipal waste composition, England 2017**; Department for Environment, Food & Rural Affairs (2021), **ENV18 - Local authority collected waste: annual results tables**
- 128 National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 129 National Infrastructure Commission (2021), **Infrastructure, Towns and Regeneration**
- 130 National Infrastructure Commission (2021), **Infrastructure, Towns and Regeneration**
- 131 HM Treasury (2021), **Autumn Budget and Spending Review 2021**
- 132 HM Treasury (2021), **Autumn Budget and Spending Review 2021**
- 133 Department for Levelling Up, Housing & Communities (2022), **Levelling Up the United Kingdom**
- 134 National Infrastructure Commission (2017), **Partnering for Prosperity: A new deal for the Cambridge-Milton Keynes-Oxford Arc**
- 135 Department for Transport (2021), **Integrated Rail Plan for the North and Midlands**
- 136 Department for Transport (2021), **Integrated Rail Plan for the North and Midlands**
- 137 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**
- 138 HM Treasury (2018), **Government response to ‘Partnering for Prosperity: a new deal for the Cambridge-Milton Keynes–Oxford Arc’** and Department for Transport (2021), **Transport Secretary launches £794 million investment to boost rail links in north and south**
- 139 HM Government (2021), **Planning for sustainable growth in the Oxford-Cambridge Arc**
- 140 Network Rail, **How the East West Rail project will make travel across Britain easier**
- 141 Network Rail, **For the first time in over 50 years, Phase 2 will create direct connections between Oxford and Bletchley/Milton Keynes**
- 142 National Infrastructure Commission (2019), **Better delivery: The challenge for freight**
- 143 Department for Transport (2021), **Decarbonising Transport A Better Greener Britain**

- 144 Department for Transport (2021), **UK confirms pledge for zero-emission HGVs by 2040 and unveils new chargepoint design**
- 145 Department for Transport (2021), **Integrated Rail Plan for the North and Midlands**
- 146 Department for Transport (2021), **Government Response to Better delivery: A challenge for freight**
- 147 Department for Transport (2021), **Planning reforms for lorry parking**
- 148 National Infrastructure Commission (2021), **Infrastructure, Towns and Regeneration**
- 149 HM Government (2020), **The Ten Point Plan for a Green Industrial Revolution**
- 150 Department for Transport, Office for Zero Emissions Vehicles (2021), **Transitioning to zero emission cars and vans: 2035 delivery plan**
- 151 HM Treasury (2021), **Autumn Budget and Spending Review 2021**
- 152 Ofgem (2021), **Enabling the Transition to Electric Vehicles: The Regulator’s Priorities for a Green, Fair, Future**
- 153 Ofgem (2021), **Enabling the Transition to Electric Vehicles: The Regulator’s Priorities for a Green, Fair, Future**
- 154 Department for Transport (2022), **Electric vehicle charging device statistics: January 2022**
- 155 Department for Transport (2022), **Electric vehicle charging device statistics: January 2022**
- 156 Competition & Markets Authority (2021), **Electric vehicle charging market study: final report**
- 157 Competition & Markets Authority (2021), **Electric vehicle charging market study: final report**
- 158 National Infrastructure Commission (2020), **Anticipate, React, Recover – Technical annex: Impact and costing note**
- 159 Cabinet Office (2021), **Government Response to the National Infrastructure Commission report ‘Anticipate, React, Recover: Resilient Infrastructure Systems’**
- 160 Cabinet Office (2021), **Global Britain in a Competitive Age: the Integrated Review of Security, Defence, Development and Foreign Policy**
- 161 HM Government (2022), **National Cyber Strategy 2022**
- 162 Department for Business, Energy & Industrial Strategy (2022), **Economic regulation policy paper**
- 163 Department for Environment, Food & Rural Affairs (2022), **Strategic Policy Statement for Ofwat**
- 164 Department for Digital, Culture, Media & Sport (2019), **Statement of Strategic Priorities for telecommunications, the management of radio spectrum, and postal services**
- 165 Department for Business, Energy & Industrial Strategy (2015), **Closed consultation Strategy and policy statement**
- 166 Department for Business, Energy & Industrial Strategy (2020), **Energy White Paper** p.90; Department for Business, Energy & Industrial Strategy (2022), **Economic Regulation Policy** p.13
- 167 Department for Business, Energy & Industrial Strategy (2022), **Strategic priorities and cross-sectoral opportunities for the utilities sectors: open letter to regulators**
- 168 Department for Business, Energy & Industrial Strategy (2022), **Economic Regulation Policy**
- 169 Department for Business, Energy & Industrial Strategy (2021), **Closed consultation Competition in onshore electricity networks**; National Grid ESO (2021), **Early Competition Plan Project**; Department for Business, Energy & Industrial Strategy (2022), **Economic regulation policy paper** p.24
- 170 National Infrastructure Commission (2018), **National Infrastructure Assessment**
- 171 HM Treasury (2021), **Autumn Budget and Spending Review 2021**; HM Treasury (2020), **Spending Review 2020**
- 172 HM Treasury (2021), **Autumn Budget and Spending Review 2021**
- 173 £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)**
- 174 HM Treasury (2021), **UK Infrastructure Bank Opens for Business**
- 175 UK Infrastructure Bank (2022), **Discussion Paper: Potential Private Sector Opportunities in Priority Sectors**
- 176 UK Infrastructure Bank (2022), **Discussion Paper: Potential Private Sector Opportunities in Priority Sectors**

**NATIONAL  
INFRASTRUCTURE  
COMMISSION**

---

Better infrastructure for all

Finlaison House  
15-17 Furnival Street  
London EC4A 1AB



[nic.org.uk](https://www.nic.org.uk)



[@NatInfraCom](https://twitter.com/NatInfraCom)

**March 2022**