NATIONAL INFRASTRUCTURE COMMISSION

ANNUAL MONITORING REPORT 2021

Contents

The Commission

The Commission's remit

The Commission provides the government with impartial, expert advice on major long term infrastructure challenges. Its remit covers all sectors of economic infrastructure: energy, transport, water and wastewater (drainage and sewerage), waste, flood risk management and digital communications. While the Commission considers the potential interactions between its infrastructure recommendations and housing supply, housing itself is not in its remit. Also out of the scope of the Commission are social infrastructure, such as schools, hospitals or prisons, agriculture, and land use.

The Commission's objectives are to support sustainable economic growth across all regions of the UK, improve competitiveness, and improve quality of life.

The Commission delivers the following core pieces of work:

- a *National Infrastructure Assessment* once in every Parliament, setting out the Commission's assessment of long term infrastructure needs with recommendations to the government
- specific studies on pressing infrastructure challenges as set by the government, taking into account the views of the Commission and stakeholders, including recommendations to government
- an *Annual Monitoring Report*, taking stock of the government's progress in areas where it has committed to taking forward recommendations of the Commission.

The Commission's binding fiscal remit requires it to demonstrate that all its recommendations for economic infrastructure are consistent with, and set out how they can be accommodated within, gross public investment in economic infrastructure of between 1.0 per cent and 1.2 per cent of GDP each year between 2020 and 2050. The Commission's reports must also include a transparent assessment of the impact on costs to businesses, consumers, government, public bodies and other end users of infrastructure that would arise from implementing the recommendations.

When making its recommendations, the Commission is required to take into account both the role of the economic regulators in regulating infrastructure providers, and the government's legal obligations, such as carbon reduction targets or making assessments of environmental impacts. The Commission's remit letter also states that the Commission must ensure its recommendations do not reopen decision making processes where programmes and work have been decided by the government or will be decided in the immediate future.

The Commission's remit extends to economic infrastructure within the UK government's competence and will evolve in line with devolution settlements. This means the Commission has a role in relation to non-devolved UK government infrastructure responsibilities in Scotland, Wales and Northern Ireland (and all sectors in England).

The Infrastructure and Projects Authority (IPA), a separate body, is responsible for ensuring the long term planning carried out by the Commission is translated into successful project delivery, once the plans have been endorsed by government.

The Commission's members

Sir John Armitt CBE (Chair) published an independent review on long term infrastructure planning in the UK in September 2013, which resulted in the National Infrastructure Commission. Sir John is the Chair of National Express Group and the City & Guilds Group. He also sits on the boards of the Berkeley Group and Expo 2020.

Professor Sir Tim Besley CBE is School Professor of Economics and Political Science and W. Arthur Lewis Professor of Development Economics at the LSE. He served as an external member of the Bank of England Monetary Policy Committee from 2006 to 2009.

Neale Coleman CBE is a co-founder of Blackstock Partnership. He worked at the Greater London Authority from 2000-2015 leading the Mayor's work on London's Olympic bid, the delivery of the games, and their regeneration legacy. Neale has also served as Policy Director for the Labour Party.

Professor David Fisk CB is the Director of the Laing O'Rourke Centre for Systems Engineering and Innovation Research at Imperial College London. He has served as Chief Scientist across several government departments including those for environment and transport, and as a member of the Gas and Electricity Markets Authority.

Andy Green CBE holds several Chair, Non-Executive Director and advisory roles, linked by his passion for how technology transforms business and our daily lives. He chairs Lowell, a major European credit management company and has served as Chair of the Digital Catapult, an initiative to help grow the UK's digital economy.

Julia Prescot holds several board and advisory roles. She is a co-founder and Chief Strategy Officer of Meridiam and sits on the Executive Committee of Meridiam SAS. She has been involved in long term infrastructure development and investment in the UK, Europe, North America and Africa. She is an Honorary Professor at the Bartlett School of Construction and Project Management, University College London. Since 2019 she has sat on the board of the Port of Tyne.

Bridget Rosewell CBE is a director, policy maker and economist. She served as Chief Economic Adviser to the Greater London Authority from 2002 to 2012 and worked extensively on infrastructure business cases. She has served as a Non-executive Director of Network Rail and Non-executive Chair of the Driver and Vehicle Standards Agency. She is currently Chair of the Atom Bank and the M6 Toll Road.

Professor Sadie Morgan OBE is a founding director of the Stirling Prize winning architectural practice dRMM. She is also Chair of the Independent Design Panel for High Speed Two and one of the Mayor of London's Design Advocates. She sits on the boards of the Major Projects Association and Homes England.

Foreword

A significant milestone was achieved at the end of 2020 with the publication of the UK's first-ever *National Infrastructure Strategy*. This was produced in response to the Commission's 2018 *National Infrastructure Assessment* which set out a costed long term plan for the UK's economic infrastructure from 2020 to 2050.

The fact that government published the *National Infrastructure Strategy* in the face of enormous upheaval created by the Covid-19 pandemic is much to its credit.

We anticipate that publication of the *National Infrastructure Strategy* will catalyse decision making and investment across all sectors, helping to address the challenges of levelling up the UK's economic geography and achieving net zero. Infrastructure can also help create the conditions for a market led recovery from the major economic impacts of the Covid-19 pandemic.

But achieving this will require detailed planning, delivery roadmaps backed up by stable funding plans and, where relevant, clarity of regulatory oversight. These are critical factors for the successful delivery of the policy aspirations and targets government has now provided.

This report sets out the priorities that need to be addressed over the next year to start turning ambitions into reality. A clear roadmap for delivering charging infrastructure is needed to enable a ban on the sale on new petrol or diesel cars within the next decade, for instance; and a workable plan for ensuring the hardest to reach homes and businesses get the benefits of high capacity broadband.

We also remain of the view that major, long term investment is needed in urban public transport outside London if we are to tackle congestion in some of our largest cities and stimulate economic growth.

In offering these proposed next steps we acknowledge the uncertain backdrop caused by one of the worst economic shocks in a century. The Commission is exploring different scenarios for the potential long term behaviour patterns that may follow the Covid-19 pandemic and influence demand for and use of infrastructure. This work will help inform our work on our second *National Infrastructure Assessment*, due to be published in 2023.

In the shorter term, when it comes to infrastructure, government's priority for the coming year must be to set out the policy levers and delivery plans with clear milestones that are needed to ensure tangible progress. 2020's policy statements set the bar high: 2021 must be a year of turning policy goals into delivery.

Sir John Armitt

Chair

Executive summary

Delivering world leading infrastructure for the UK requires sound decisions and long term planning. This is even more important in the context of uncertainty and change created by the Covid-19 pandemic. The Commission welcomes the publication of the government's *National Infrastructure Strategy*, which represents a solid down payment on a long term fiscal commitment to infrastructure.

In 2021 the Commission hopes to see clear plans for how the ambitions in the *National Infrastructure Strategy* will become reality. The priorities for 2021 include:

- setting out clear plans to decarbonise the economy, including for electric vehicle charging infrastructure, freight decarbonisation, heat decarbonisation, developing the hydrogen industry, and delivering an energy efficient building stock
- a long term, strategic approach to transport investment and devolution in cities and regions
- maintaining progress on broadband roll-out, and developing a plan for roll out to the hardest to reach areas of the country
- establishing an infrastructure bank
- updating economic regulation
- setting out how infrastructure systems should respond to shocks and stresses.

The government published its *National Infrastructure Strategy* on 25 November 2020, accompanied by a detailed and comprehensive response to the recommendations that the Commission made in the *National Infrastructure Assessment* in July 2018. The Commission believes the UK's first ever *National Infrastructure Strategy* will catalyse planning, decision making, investment and delivery across all sectors, and ensure that infrastructure supports delivery of long term challenges such as achieving net zero greenhouse gas emissions by 2050 and 'levelling up' the economy across the UK.

The *National Infrastructure Strategy* aligns closely with the Commission's own independent assessment of the country's infrastructure needs and how to address them. Government has endorsed or partially endorsed most of the recommendations. This is a significant step forward. The priority for the coming year is to turn the ambition into reality.

The impact of the Covid-19 pandemic and associated restrictions have been hugely significant for infrastructure use across a range of sectors. Uptake of digital and online services has surged, while public transport use has dropped to a fraction of normal levels. There has been speculation about the future norms for working and socialising when restrictions are ended.

Decision makers need to be prepared for a range of possible futures. The Commission will consider in its future work, especially the next National Infrastructure Assessment, how potential long term trends following the Covid-19 pandemic could influence demand for and use of infrastructure.

Turning ambitions into reality

In this report, the Commission will take stock of the government's progress in areas where it has committed to taking forward the Commission's recommendations.

In May 2019, the Commission set out four tests that the government's infrastructure strategy[1] would need to meet to deliver the ambitious, long term vision for the UK's infrastructure as set out in the Commission's 2018 *National Infrastructure Assessment*. These were:

- **A long term perspective** – the strategy must look beyond the immediate spending review period and set out the government's expectations for infrastructure funding and policy up to 2050
- **Clear goals and plans to achieve them** – where the government endorses an Assessment recommendation, this should be backed up with a specific plan, with clear deadlines and identified owners, to ensure the Commission can easily check progress
- **A firm funding commitment** – the government should commit to providing funding in line with the upper limit of the agreed guideline of 1.2 per cent of GDP a year invested in infrastructure
- **A genuine commitment to change** – recommendations such as devolving funding for urban transport to cities and a national standard for flood resilience are fundamental policy changes, and the strategy needs to respond in the same spirit.

1. A long term perspective

The government has set out long term goals for low carbon energy infrastructure, solid waste, and drought resilience. But in certain areas, the government continues to take a shorter-term approach, or has yet to set out its final view.

Long term policy objectives such as decarbonising the economy must be underpinned by a regulatory system that helps deliver these aims. The government has responded to the Commission's recommendations on updating economic regulation but will set out further details in a number of key areas later this year. In particular, government has yet to commit to legislating to give regulators net zero and collaboration duties, and developing mechanisms to introduce more competition to facilitate strategic investment in water and energy requires attention. The Commission also awaits a formal response to its *Anticipate, react, recover – Resilient infrastructure systems* study which makes recommendations on how to make the UK's infrastructure resilient to shocks and for the long term.

Infrastructure can play a role in delivering government's commitment to 'level up' the UK economy, by bolstering connectivity and productivity in areas with the potential for higher growth. While government has partially endorsed the Commission's recommendations on urban transport, it has not yet set out a long term plan on the scale required for cities outside London to make a step change in the performance of their transport networks.

2. Clear goals and plans to achieve them

The government has set clear, measurable and timebound targets to:

- phase out new sales of petrol and diesel cars and vans
- increase solid waste recycling rates
- rollout gigabit capable broadband
- reduce water leakage
- carry out trials of hydrogen production
- implement low carbon heating
- deploy offshore wind.

The next step is for government to set out clear plans to deliver these goals.

Energy and waste

With the *National Infrastructure Strategy* and *Energy White Paper*, government has set clear goals for many parts of the energy system, including renewables, nuclear, hydrogen, heat and electric vehicles. These goals, alongside clarity on the pace and timetable for decarbonisation, are important to help businesses align their investment and planning decisions and to frame economic regulation. It is critical these goals are now underpinned by specific policy levers and delivery plans with clear milestones, in order to allow progress to be tracked on a regular basis and the desired outcomes to be achieved. The forthcoming strategies for hydrogen, and heat and buildings, and electric vehicle charging infrastructure provide the opportunity to set out such an approach.

These strategies should be matched with appropriate funding commitments to secure the goals. The government should set out the details of the revenue mechanisms that will be required to encourage private sector capital into deploying the technologies needed to meet the net zero target. Finally, the model of economic regulation framework must also evolve to facilitate the investment required for net zero, as set out in chapter seven.

The government has committed to deliver 40 GW of offshore wind by 2030, which means the UK could be generating 65 per cent of its electricity from renewable sources by 2030. Near term policy actions have been identified that will help to deliver this, including a commitment to holding Contracts for Difference auctions approximately every two years, ensuring these auctions are open to onshore and solar, and the government is proposing to include floating offshore wind in these auctions. These actions are in line with the Commission's recommendations and will help to deliver the low cost, zero carbon electricity system of the future.

The government's vision for heating and hydrogen also needs to be supported by clear plans. The government has committed to large scale trials of hydrogen for heating in homes and has set a target of five GW of low carbon hydrogen production capacity by 2030. At the same time, the government has set a target of deploying 600,000 heat pumps per year by 2028 and has committed significant sums of public money to ensuring England's building stock is energy efficient. It is important that government takes the necessary steps now to enable the decisions that will need to be taken in the mid to late-2020s about the best solutions to decarbonise heating.

The government has set out its ambitions for waste and recycling, seeking new statutory powers and consulting on implementation. It needs to sustain momentum and build the necessary consensus between policy makers, industry and consumers to ensure tangible progress can be seen.

Road and rail

The government has committed to publishing an Integrated Rail Plan for the Midlands and the North. The Commission published its advice to government on this in its *Rail Needs Assessment for the Midlands and the North*, published in December 2020. Timely publication of the Integrated Rail Plan will provide the direction and clarity that is needed to enable investment decisions to be made.

The government has made a big step forward to deliver on the recommendations in the Commission's *Partnering for Prosperity* report to develop the transformational economic potential of the Oxford-Cambridge Arc, announcing funding for phase 2 of East West Rail in January this year. In addition to the £760 million announced for building the Bicester to Bletchley section of the East West Rail scheme, the government also reaffirmed its commitment to the region by providing additional funding in the 2020 Spending Review to support the development of a Spatial Framework and to explore the case for up to four Development Corporations along the route of East West Rail.

The Commission welcomes the government bringing forward the date to end the sale of new petrol and diesel cars and vans in the UK to 2030. It is now critical that the charge point infrastructure is in place to facilitate this. The government needs to produce a delivery roadmap for electric vehicle charging infrastructure with clear milestones to meet the 2030 target. In addition, Ofgem should ensure that the upcoming price controls facilitate the investment in distribution networks required to support the efficient deployment of electric vehicle charge points.

Road freight is a sector that needs greater support and faster action in order to decarbonise at the rate needed to meet the UK's carbon emission goals. The government has announced that it will provide a full response to the Commission's report *Better Delivery: the challenge for freight*, published in April 2019, through the publication of a comprehensive cross modal strategy in 2021. The Commission hopes to see a firm commitment to phase out the sale of new diesel HGVs by 2040 along with detailed decarbonisation plans.

Digital

The UK's high capacity digital connectivity has improved significantly in recent years, with government targeting a minimum of 85 per cent gigabit capable broadband coverage by 2025. 38 per cent of UK premises now have access to gigabit-capable broadband (any broadband technology that can deliver speeds of one gigabit per second). 20 per cent have access to full fibre, which is the most reliable and future-proof broadband technology.

This is the result, in part, of network competition between incumbent and new players driving investment, and a more supportive policy and regulatory environment. Despite the current pace of roll out, there is a risk that a digital divide will persist unless there is a published plan for roll out to the vast majority of the hardest to reach premises.

Water and floods

The water industry's ability to plan for the long term has been transformed since the publication of the *National Infrastructure Assessment*. Clear targets to increase resilience to drought and reduce demand, including halving leakage by 2050, have provided a clear focus. Working with regulators, government has established a national framework and regional planning to inform the next round of investment plans. Strategic schemes are being considered through a competitive process.

The government's flood policy statement, together with the Environment Agency's strategy, set out how it plans to create a nation more resilient to floods. The Commission welcomes the £5.2 billion the government has committed to invest over the next six years in managing flood risk. However, it believes government should provide greater clarity on how much resilience will be increased and by when. The government has also committed to enhance the planning system for new developments to ensure flood risk is adequately considered.

3. A firm funding commitment

The government committed to invest £27 billion in economic infrastructure in 2021/22 in the *National Infrastructure Strategy*. This is equivalent to just under 1.2 per cent of GDP, the upper end of the Commission's fiscal remit. The Commission welcomes the scale of investment, which is a substantial increase compared to recent years where spending has been closer to 0.9 per cent of GDP.[2] The 2020 Spending Review also included multi-year capital funding commitments for some infrastructure projects such as improving flood defences and the roll-out of gigabit-capable broadband.

This year, the government intends to review the fiscal remit for the Commission, to ensure it reflects the government's long term ambitions. The Commission looks forward to engaging with this process. The essential consideration for infrastructure is not simply how much is spent but how well it is spent. As set out in chapter two, the Commission's view is that certain infrastructure decisions must make the best use of knowledge of local conditions and be shaped by local priorities.

The private sector is responsible for the majority of the UK's economic infrastructure investment. Many of the UK's economic infrastructure sectors, including energy generation and distribution, digital telecoms, and water and wastewater, are privately owned and managed. The Commission is pleased that government accepted its recommendation to set up an infrastructure bank to catalyse private sector investment. The bank should be founded on the principles of sound banking, additionality and transformational impact, and there should be a governance structure that supports the operational independence of the bank to ensure market confidence. The Commission looks forward to having a close relationship with the bank to ensure infrastructure investment is anchored in long term strategy.

4. A genuine commitment to change

Many of the Commission's recommendations, whether on nuclear power and renewables, urban transport, electric vehicles or flood risk management, do not represent tweaks to existing policy but a fundamental shift. The government has taken some significant decisions but there is still more to do to meet the scale of challenges.

As outlined above, the establishment of the infrastructure bank has the potential to catalyse the development of new infrastructure technologies and support long term investment in UK infrastructure.

The government's decision to bring forward its plans to phase out new sales of petrol and diesel cars and vans from 2030, in line with the Commission's recommendation, is significant. But it has not yet been matched by a similarly binding ambition on diesel heavy goods vehicles and there is not yet a strategy from government for a decarbonised freight sector.

The government has shifted decisively in favour of a flexible, highly renewable electricity system and has clarified its position on the role of nuclear in the electricity mix. The aim is to bring at least one large scale project to Final Investment Decision by the end of this Parliament. This 'one by one' approach is in line with the Commission's position. Government's ability to deliver on this commitment will depend on resolving the question of financing. The government is also to be commended for taking a strategic bet on hydrogen by committing to large scale trials of hydrogen for heating in homes.

Some less high-profile commitments in the *National Infrastructure Strategy* could significantly improve the way projects are delivered, in particular, the decisions to publish cost and performance data and business cases, and to embed good design at the heart of infrastructure projects. Long term decisions and major projects inevitably carry risks, but decision-making can be improved at every stage of infrastructure development through better data and recognising the value of good design. The Commission is pleased to see government back the Commission's recommendation for major national infrastructure projects to have a board-level design champion supported by a design panel, to help ensure schemes are built sustainably to a high standard.

Although the government has agreed with the Commission that the UK's system of economic regulation needs updating, it has yet to say how that will be done.

The government has partially endorsed the Commission's recommendations that cities should have the funding and powers they need to pursue ambitious, integrated infrastructure strategies. Metro mayors will be given a five-year budget, starting next year, which is welcome and will provide more stability to investments. But to see transformative change the government will need to go farther, supporting urban transport projects that could make a real difference to congestion, productivity and quality of life in fast growing places.

Projects on the scale needed will take a decade to deliver so work should start now on identifying priority cities for a pipeline of major projects, and setting aside funding in the order of £30 billion by 2040 to support development of specific programmes in partnership with cities. City authorities should be set the goal of raising at least 25 per cent of the cost of any major improvements locally, with government working with them to ensure the right mechanisms are available for raising this funding.

Funding will not be the only part of the plan needed to make a success of better local infrastructure. The government should consider how to bring together local devolution and longer-term funding into a new model, putting decision making into the hands of local leaders but also making clear how they will be accountable for delivering benefits locally. Devolved budgets should be spread to more cities and places across the country and embedded in legislation to mark a permanent change away from short term, fragmented funding pots.

Key priorities for 2021

In 2021 the Commission would like to see the following taken forward as key priorities:

- decarbonise the economy:
  - produce a delivery roadmap for electric vehicle charging infrastructure to meet the 2030 end to new diesel and petrol car and vans sales including ensuring that future price controls facilitate the necessary investment in the electricity grid
  - publish a comprehensive cross-modal freight strategy with a firm commitment to phase out diesel HGVs by 2040 along with detailed decarbonisation plans consulted on with the road haulage and logistics industry
  - develop clear, actionable, and funded plans to deliver on energy commitments made in the *Ten Point Plan for a Green Industrial Revolution*, and the *National Infrastructure Strategy*, including setting out next steps on heat decarbonisation and the development of a hydrogen industry
  - further improve energy efficiency schemes to deliver a material increase in the energy efficiency of the country's building stock over the coming year
- a long term, strategic approach to transport investment and devolution in cities and regions:
  - set out a pathway to major urban transport investment in the 2030s, with a committed long term funding envelope in the order of £30 billion between now and 2040 including 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
  - set out proposals for continuous five year local transport budgets for mayoral authorities in England to continue beyond 2027, along with considering long term funding, decision-making and local accountability to make devolution a success
- maintain progress on broadband roll out:
  - set out a clear plan with milestones and funding for delivery of high capacity broadband to the hardest to reach 20 per cent of UK premises
- establishment of an infrastructure bank:
  - ensure the bank is operational in an interim form from spring 2021, so it can support infrastructure projects to help meet the objectives of economic recovery, net zero and levelling up
- update economic regulation:
  - develop a road map enabling regulators to legislate for net zero and collaboration duties, creating mechanisms to introduce more competition to facilitate strategic investment and innovation in water and energy
- set out how infrastructure systems should respond to shocks and stresses:
  - respond to the Commission's resilience recommendations, including the resilience duties originally recommended in *Strategic Investment and Public Confidence*.

1. Energy and Waste

Energy infrastructure sits at the centre of the modern economy, from heating homes to powering data centres. Decarbonising the electricity system in order to achieve net zero carbon emissions by 2050 will require replacing fossil fuels with clean energy technologies such as renewables and hydrogen. The UK also needs to deploy solutions for the future of heating to end the country's reliance on natural gas. Government has begun to take a long term perspective on these challenges and set ambitious goals for deployment of new low carbon technologies. This must now be followed up with detailed plans for delivery.

In the *National Infrastructure Strategy* and *Energy White Paper*, the government made ambitious new commitments for the next two decades:

- a decisive policy shift in favour of a flexible, highly renewable electricity system, as advocated by the Commission[3]
- a commitment to large scale trials of hydrogen for heating in homes
- a target of five GW of low carbon hydrogen production capacity by 2030
- a target of deploying 600,000 heat pumps per year by 2028
- investment in improving the efficiency of England's building stock.[4]

This ambition is very welcome. However, there is not yet full clarity over funding, and detailed plans to achieve many of the goals are still needed. The UK's role in hosting the Conference of Parties in Glasgow this year (COP 26) is an opportunity for the UK to showcase its leadership on tackling climate change. Where government has committed to solutions and announced funding, such as on energy efficiency, attention should now be turned to deployment. In other areas, such as heat pumps and hydrogen deployment, specific plans are now needed to ensure that the strong ambition is turned into reality later this decade.

The forthcoming strategies for hydrogen, and heat and buildings, and electric vehicle charging infrastructure provide the opportunity to set out policy levers and clear plans. These strategies should be matched with appropriate funding commitments to secure the goals. The government should also set out the details of the revenue mechanisms that will be required to encourage private sector capital into deploying the technologies needed to meet the net zero target, and the model of economic regulation framework must also evolve to facilitate the investment required for net zero, as set out in chapter seven.

The Commission welcomes the largely positive response from the government to its recommendations on waste and understands the rationale where the government has not chosen to endorse specific targets. The Commission sees the advantage of the long term plans to reduce waste and improve recycling set out in the government's *Our Waste, Our Resources: A strategy for England* and the regulatory framework that it plans to establish through the Environment Bill. It will be vital that the government keeps up the promised pace of change including completing the passage of the Environment Bill.

Energy and waste for a low cost, zero carbon future

Energy infrastructure sits at the centre of a modern economy – from heating homes to powering data centres. A secure and reliable supply of energy is central to everyday life. And whilst it's easy to lose focus on the importance of a resilient energy supply, it becomes painfully apparent on the very rare occasion that there is a failure in the system, such as the 9 August 2019 power cuts.[5] However, the existing UK energy infrastructure is carbon intensive, and this must continue to change.

A net zero future can only be realised if government takes strong policy action, aligns regulation, and mobilises or facilitates significant private sector investment. To do this, the public and private sectors must have a shared vision for the steps that need to be taken. Government must play a crucial role in setting out a coherent long term agenda that will allow regulators and industry to plan and deliver together. The development of new technologies needed to meet net zero will require government leadership to support private sector investment. The establishment of the new infrastructure bank has the potential to accelerate the development of these technologies through provision of early stage risk capital and catalysing additional private sector investment.

Since the Commission published the *National Infrastructure Assessment* the UK has significantly increased its ambition on tackling climate change. This only makes the Commission's recommendations more urgent. In July 2019 the UK government legislated for a new net zero 2050 climate target, requiring that the country eliminate all emissions, on a net basis, by 2050.[6] More recently, in December 2020, the UK set a new 2030 climate target through its Nationally Determined Contribution under the Paris Agreement. This set a target of reducing emissions by 2030 by at least 68 per cent based on 1990 levels, a significant increase on previous commitments.[7] The Commission considered the impact that the net zero target would have on its recommendations in 2020; this concluded that the Commission's recommendations were key to meeting these new targets.[8]

In the *National Infrastructure Assessment*, the Commission set out clear, robust, and achievable actions for government to take in the near term to support the decarbonisation of the power sector:

- **Setting the UK on the pathway to a highly renewable system** - This is the best way to reduce emissions, keep costs low, and maintain optionality in a rapidly changing sector. Driven by the recent cost reductions in renewables, the Commission increased its ambition in this area, recommending that the country should be running off 65 per cent renewable generation by 2030.[9]
- **A 'one by one' approach to nuclear** – Alongside making recommendations on renewables, the Commission also made the case that government should take a 'one by one' approach to new nuclear plants, as opposed to the previous policy of supporting a large fleet of nuclear reactors. The Commission therefore recommended that government should agree to support no more than one new nuclear plant, in addition to Hinkley Point C, before 2025. Evidence currently suggests that systems with a high proportion of renewables are likely

to be the cheapest, and could be even cheaper if other technologies, such as hydrogen turbines, are deployed alongside them. However, given the level of uncertainty in the evidence it would be premature to rule out other options, such as nuclear, now.

Following the Assessment, the Commission advised in its report *Strategic Investment and Public Confidence* that government should set out a long term strategic vision for the energy sector through the publication of a strategic policy statement. This is crucial to ensuring the independent regulator, Ofgem, is able to make decisions that fit with the long term needs of the country. Forward-looking regulation is the best way to approach balancing the needs of consumers and investors while ensuring efficiency. But it must be supplemented by government playing a role in providing long term strategic leadership.

The Commission also focused on the need to begin decarbonising heat in the building stock. Changing how the country heats almost all of its buildings in less than 30 years is one of the biggest infrastructure challenges the country faces. Currently, the costs of the two most promising technologies, heat pumps and hydrogen boilers, are high. In addition to the costs, consumers will likely face high levels of disruption when they are installed, and supply chains need to be significantly strengthened if either of these technologies are to be deployed at scale in the coming decades.

It is crucial that government takes steps to establish a better evidence base for both these technologies before making strategic decisions on the future of heat in the mid to late-2020s. However, regardless of the mix of technologies used for heating in the future, the energy efficiency of the building stock must be improved. This is essential so that these new technologies can be deployed whilst keeping costs low. In the *National Infrastructure Assessment* the Commission set out that:

- the government should set a target of installing 21,000 energy efficiency measures per week by 2020 and maintain this rate of installation through the 2020s, by allocating £3.8 billion in funding for social housing, setting out new regulations for the private rented sector, and trialling innovative approaches for delivering energy efficiency in the owner occupier market
- to better assess the viability of hydrogen a community scale trial of hydrogen heating should be delivered by 2021 and a larger trial, of at least 10,000 homes, should be launched by 2023, with the hydrogen to supply these trials generated from gas reforming with carbon capture and storage
- by 2021, government should establish an up to date evidence base on the performance of heat pumps within the UK building stock and the scope for future reductions in the cost of installation.

The challenges of preparing the UK's energy infrastructure for the future requires government to take a strategic approach, which links long term priorities with short term actions. The Commission's set of recommendations were not intended to be sufficient to fully meet these challenges. The Commission will continue to make recommendations to government on how it can best meet the challenge of delivering, secure, and net zero consistent energy infrastructure for the coming decades.

Waste

The *National Infrastructure Assessment* identified that much of England's waste is still incinerated to produce electricity and heat. Lower cost, lower carbon options exist for many types of waste such as food waste and plastics. At the time, the UK's plastic recycling rate was just 30 per cent, and 53 per cent of households were throwing away items that could be recycled.[10] The Commission recommended practical steps to enable a step change:

- separate food waste collection for all households and businesses in England to enable biogas production
- change how waste is collected to enable higher recycling rates
- revised packaging and labelling to use less resources and encourage easier recycling
- restrictions on the use of the most difficult to recycle plastic packaging.

Progress

Government has made good progress in delivering the Commission's recommendations on the energy sector. In recent months, new policy and funding has been announced to deliver more renewables, more energy efficiency, and more low carbon heating solutions.[11] The government has also moved to a 'one by one' approach to nuclear.[12] These steps show government is taking a long term perspective and has made significant changes in policy to respond to the challenge of delivering the needed energy infrastructure for the country. But given the scale of the challenge, the momentum gained in 2020 must be maintained through the coming years and decades.

Alongside the *National Infrastructure Strategy*, the Commission welcomes the publication of *The Ten Point Plan for a Green Industrial Revolution* and the *Energy White Paper: Powering our net zero future*. These documents set out a clear and credible vision for the future of the UK's energy system and contain concrete funding commitments for near term action.

Over the coming year government is expected to publish a range of key strategy and policy documents central to the future of the country's energy infrastructure. More detail is expected to be provided in the *Heat and Buildings Strategy*, the *Hydrogen Strategy*, the *Net Zero Review*, the *Net Zero Strategy*, and many others. These should be brought forward in a timely manner and contain concrete and actionable plans.

Whilst action is needed now, and over the coming decade, there is also a need for even longer-term strategic thinking. Challenges such as decarbonising heating or developing an at scale hydrogen economy stretch well into the 2030s and beyond. The Commission will continue to play its role providing expert advice focused firmly on the long term and identify the pathways required to meet long term challenges. The Commission will consider these areas in more depth in the next *National Infrastructure Assessment*.

Power sector

In the *National Infrastructure Strategy*, *The Ten Point Plan for a Green Industrial Revolution*, and the *Energy White Paper*, the government has committed to delivering 40 GW of offshore wind by 2030. This is a clear goal backed by a plan of action to deliver it. The reopening of pot one auctions for onshore wind and solar represents real progress.[13] The commitment to holding Contracts for Difference auctions approximately every two years,[14] better accounting for whole system costs in the auctions, and considering the case for more innovative technologies, such as floating offshore wind, are also all welcome. These actions are in line with the Commission's recommendations and will help to deliver the low cost, low carbon electricity system of the future.

Alongside renewables, government intends to bring at least one large scale nuclear project to Final Investment Decision by the end of this Parliament, subject to clear value for money and all relevant approvals.[15] This 'one by one' approach is in line with the Commission's recommendations in the

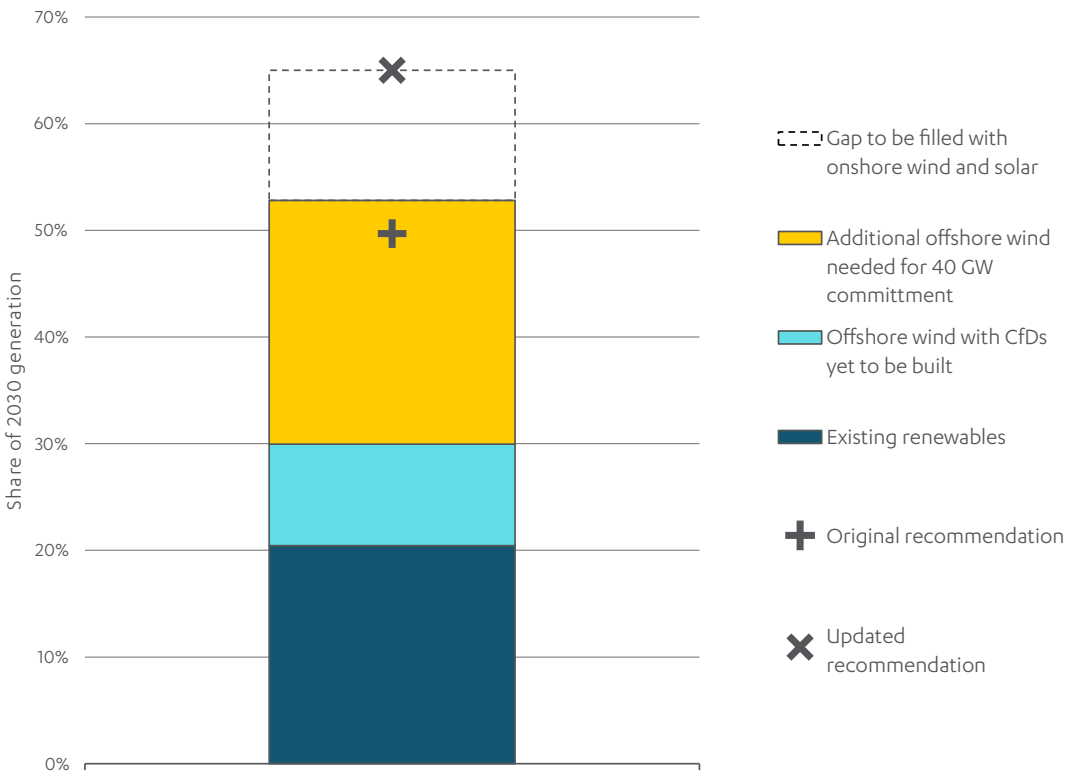
2018 *National Infrastructure Assessment*. The government's position is pragmatic and will maintain optionality for the future whilst allowing the necessary near term action on renewables to be taken. The government has also recognised the clear challenges of procurement and the need for a financing model that appropriately balances risk and reward between public and private sectors.[16] An appropriate methodology must be used when assessing different financing routes, ensuring that 'hidden' costs from different financing models and risk allocations are properly accounted for and data is used to underpin these assessments where possible.[17]

To facilitate the deployment of renewables over the coming decade government must make progress on developing a smart flexible electricity system. As the Commission set out in *Smart Power* in 2016, increasing electricity system flexibility will allow for more efficient management of the system.[18] Government has recognised this, accepting the Commission's recommendations and taking action through its *Smart Systems and Flexibility Plan*.[19] But policy and reforms must now translate into more flexible technologies being deployed on the electricity system. This is a vital step in facilitating the deployment of the significant volumes of renewables the government has committed to. Without significant increases in electricity system flexibility a highly renewables electricity system, and the cost and carbon savings it will bring, will not be deliverable.

The recent *Energy White Paper* has also committed government to setting out a strategic policy statement for the energy sector and legislating to enable the competitive tendering in building, ownership and operating of the onshore electricity network. These meet recommendations the Commission set out in its report on regulation: *Strategic Investment and Public Confidence*.[20] It is essential that the strategic policy statement considers the coming challenges and provides strategic leadership. It must support the significant level of investment that will be needed by the sector while not interfering with the independence of the regulatory model.

These commitments will drive action but momentum must be maintained. To deliver 65 per cent renewable generation by 2030 requires significant new capacity to be deployed over the next decade. The commitment to 40 GW goes a long way to meeting this but onshore wind and solar will also be needed (Figure 1). Whilst government has made great progress in the last year it is important that focus on delivery is maintained to ensure the gap to 65 per cent renewables is filled.

Figure 1: Estimate of 2030 renewables share of generation under current commitments and policies[21]



Notes: Share of generation based on a central estimate of 419 TWh of generation demand in 2030. Large scale biomass is assumed to come offline after 2027 when renewable obligation certificate and contracts-for-difference subsidies end. If it remained online, it would fill most of the existing gap.

Alongside installing more capacity, government should continue to consider how renewables can be deployed efficiently. The Commission continues to favour the use of existing market mechanisms due to the certainty that they provide. However, the Commission has recommended that the costs and benefits that renewables bring should be better reflected in the Contracts for Difference mechanism over time. This will help move the system closer to its lowest possible cost. Government's endorsement of this recommendations is welcome, as is the recent call for evidence on developing the Contracts for Difference mechanism to enable a highly renewable net zero electricity system.[22] Focus on this should not be lost whilst delivery moves forward.

Heating

Decarbonising heating is one of the most difficult infrastructure and net zero challenges the country faces. The Commission welcomes government's ambition for hydrogen trials and heat pump deployment. While the government has set out some clear goals, it is essential that these are backed up with detailed plans and firm funding. The upcoming *Heat and Building Strategy* provides an opportunity to do this.

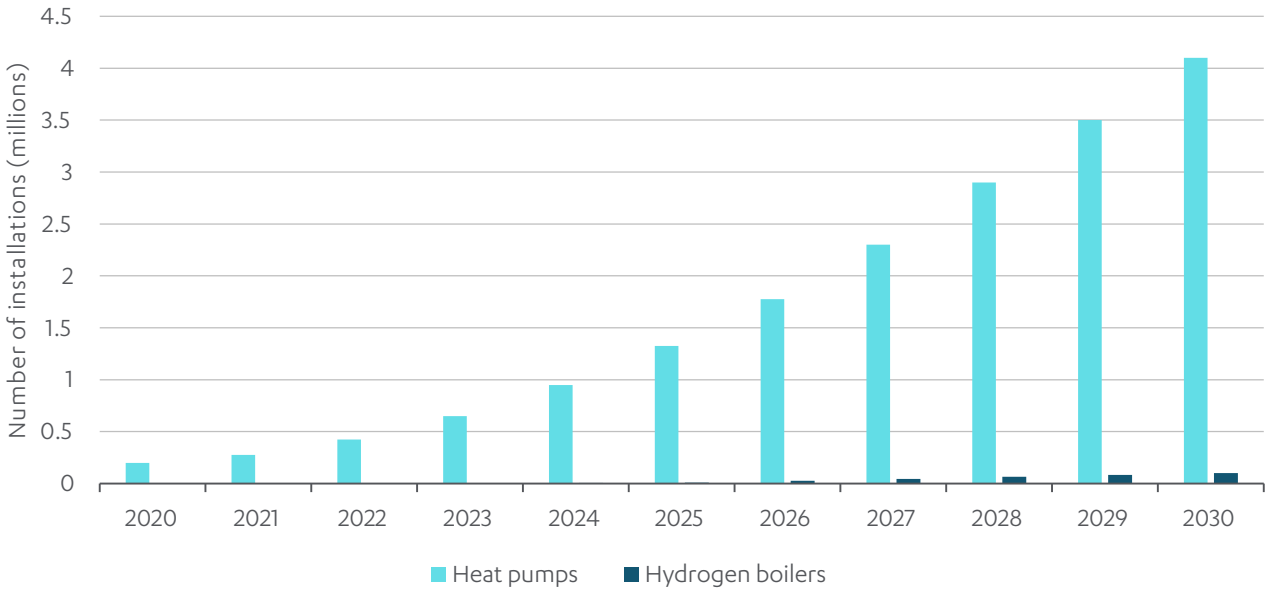
The strategy must also focus on developing a robust evidence base – through real world deployment – that enables government to make key strategic decisions on the long term future of heat by the mid to late-2020s. The need to make these decisions by the mid to late-2020s should be central to all government action in this space. Without this, the country will be poorly placed to meet the critical infrastructure challenge of decarbonising the heating supply.

On hydrogen, action is being taken to establish the safety case for hydrogen, and to understand hydrogen production technologies. The government has committed to neighbourhood (2023), village (2025), and town trials (2030) of hydrogen. These follow the pathway set out by the Commission, but are delivered on a slower timeline and the government has not been clear about how many premises will be involved in each of the trials. Waiting until 2030 to complete a town trial of hydrogen means that hydrogen for heat may be a less mature industry than heat pumps.

The government has also set targets for one GW of low carbon hydrogen production capacity by 2025 and five GW by 2030. Meeting these would allow the UK to produce up to 40 TWh of low carbon hydrogen by 2030, equivalent to around 5 per cent of current UK natural gas demand.[23] If the UK is to develop a hydrogen economy at the scale needed to heat homes, fuel industry, power transport or supply power stations then it must develop the large scale infrastructure needed in a short timescale. It is, therefore, essential that these targets are at least met or ideally exceeded. To do this, government must provide more detailed plans and set out the pathway ahead in the upcoming *Hydrogen Strategy*. As the Commission has previously discussed this must include consideration of not only hydrogen for heat but also its potential for decarbonising heavy goods vehicles and the critical role it could play in the electricity system by providing low carbon flexible power.[24]

The recent commitment to achieve 600,000 heat pump installations per year by 2028 is a positive step on heat decarbonisation. It's clear that this will create an updated evidence base as the Commission recommended. The 600,000 target implies that there will be approximately four million heat pumps installed by 2030 (Figure 2). This is roughly the same as the number of off gas grid homes, where heat pumps are the obvious decarbonisation solution.

Figure 2: Illustrative cumulative profile of heat pumps and hydrogen boilers installed under the commitments from the *Ten Point Plan for a Green Industrial Revolution*[25]



Notes: Heat pumps deployment is assumed to increase linearly between now and the 600,000 target for 2028. Installation rates are then held constant between 2028 – 2030. Hydrogen boiler deployment is based on commitments in HM Government (2020), the *Ten Point Plan for a Green Industrial Revolution* and an assumed neighbourhood population of 500, village population of 10,000 and town population of 100,000.

These actions, along with the recent *Energy White Paper*, imply a recognition of the challenge of decarbonising the country's heating supply. The government will have to make challenging and contentious decisions on the future of the UK's heating infrastructure by the mid to late-2020s. Recent commitments will help to develop a mature evidence base, but this is the beginning rather than the end of the action needed.

Energy Efficiency

The Commission welcomed the Chancellor's summer announcement that government would provide £2 billion in grants to improve the energy efficiency of 600,000 homes and a £50 million pilot for energy efficiency in social housing as positive first steps.[26] Recent announcements build on this with further funding announced for existing energy efficiency schemes.[27] However, despite high demand, progress in delivering energy efficiency measures has been slow. The Environmental Audit Committee recently raised its concerns, noting that 20,000 grants have been issued in the first four months of the scheme against the stated target of 600,000 such awards.[28] Installation rates must now rapidly increase.

Government notes that the Green Homes Grants scheme is under continuous review. Beyond refinements to existing schemes, the Commission believes that policy should move from providing rolling short term plans to setting out a clear long term strategy with appropriate funding for increasing the energy efficiency of the building stock. Energy efficient buildings are cheaper for consumers to heat and will place a lower demand on the rest of the energy system by requiring less low carbon gas or electricity to run. Moreover, heat pumps can only be effectively deployed in energy efficient buildings, so to keep large scale heat pump deployment as an option the efficiency of the building stock must be raised. If energy efficiency is to be deployed efficiently over the coming decade government will need to provide clarity to the industry and give supply chains the certainty they need to rapidly scale up.

The recent consultation on increasing energy efficiency standards in the private rented sector to EPC C are welcome in this regard.[29] Increasing the ambition of these standards would represent a step change in action and should result in vital improvements in the energy efficiency of this segment of the building stock. The recent consultation on how mortgage lenders could support homeowners in making energy efficiency improvements is also welcome.

Across all its policies and programmes, government must now ensure action is being delivered on the ground and the energy efficiency of the building stock is increasing at the necessary rate. This will involve setting clear goals. The government has not endorsed the Commission's recommendation of targeting 21,000 installed measures per week, arguing it is better to measure performance improvements rather than number of installations. The Commission accepts this, but it does not remove the need for a clear target to be set out, commensurate with the Commission's ambition, with appropriate interim milestones. The upcoming *Heat and Buildings Strategy* provides the opportunity to do this.

Waste

The government published its waste strategy for England in 2018 setting out its ambition and strategy to reform the waste sector.[30] Making these high-level commitments reality will require some further statements from government, following consultation, as well as legislation. The government has introduced the Environment Bill which will allow it to establish the regulatory framework, but the Bill's passage has been delayed.

The government's waste strategy set a target for 65 per cent of municipal waste to be recycled by 2035. This is later than the Commission recommended, but it should help achieve a consistent recycling collection by local authorities and businesses as well as help minimise costs for small businesses. The government does not agree with 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 target recycling target.

The Commission welcomes the government's full endorsement of its recommendations for a consistent national standard of recycling for households and business and a requirement to separate food waste by 2025. The Commission also acknowledges the government's commitment to consider the case for mandatory labelling and looks forward to its consultation later in 2021.

The government partially endorsed the Commission's recommendations on plastic recycling, committing to working towards all plastic packaging placed on the market being recyclable, reusable or compostable by 2025. It has not committed to the Commission's proposed target of 75 per cent by 2030. However, it will consult, in 2021, to set its own target for 2030. The target will be informed by analysis underpinning its wider waste sector reforms which should be enabled by the passing of the Environment Bill. The Commission is clear that the target the government develops will still need to be ambitious.

The Commission notes the government's continued work to introduce incentives to improve product design to improve the recyclability of packaging. The government's continued commitment to eliminate hard to recycle plastics from use in packaging is positive.

The Commission welcomes the government's endorsement of its recommendation to establish and mandate a common data reporting framework for businesses handling waste. The government has allocated £7.2 million in capital funding towards the development of the digital and waste tracking system, helping improve the quality and accuracy of waste data.

Priorities for 2021

In 2021, the Commission would like to see government:

- develop clear, actionable, and funded plans to deliver on commitments made in the *Ten Point Plan for a Green Industrial Revolution*, and the *National Infrastructure Strategy*, including setting out next steps on heat decarbonisation and the development of a hydrogen industry
- further improve energy efficiency schemes to deliver a material increase in the energy efficiency of the country's building stock over the coming year.

2. Transport for Towns and Cities

Infrastructure can play a role in delivering government's commitment to 'level up' the UK economy by bolstering connectivity and productivity in areas with the potential for higher growth. The government has highlighted the role for infrastructure investment in rebalancing regional growth but has yet to set out a sufficiently ambitious long term plan to achieve this.

A move to a new model of long term and locally led investment in transport networks within cities is critical to supporting future economic growth and levelling up. The Commission welcomes the commitment to give eight metro mayors a share of £4.2 billion as part of five year, devolved transport budgets for small to medium sized local transport projects. This is a firm funding commitment for the medium term, allowing metro mayors to make investment decisions at a city region level. However, the Commission would like this to be made on a rolling basis and therefore would like to see the government put in place legislation that enables this for cities in England.

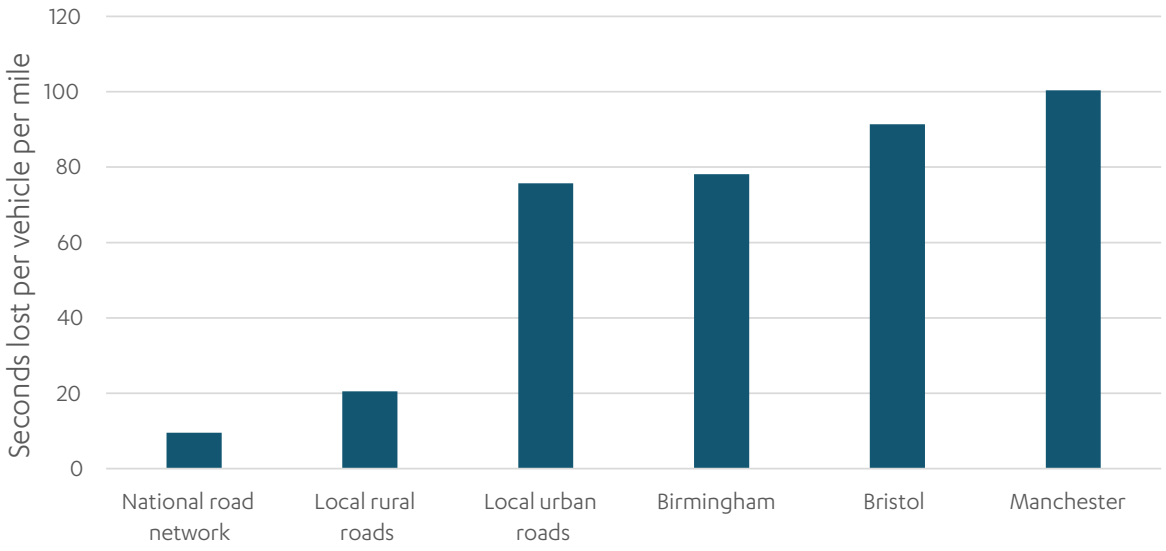
With regard to major urban transport scheme investment, the government has not yet signalled the level of change that would be needed to deliver locally led, long term investment of this nature that can contribute to regional productivity improvements. There needs to be a genuine, long term commitment to transformative urban transport upgrades, underpinned by funding in the order of £30 billion between now and 2040 which is in addition to devolved budgets.

A new model for long term, locally led urban transport

The government has set itself the ambition of levelling up economic outcomes between regions, emphasising the role of infrastructure in regional rebalancing. This is a major challenge. Regional economic inequality in the UK is high, in absolute terms and when compared internationally, and has persisted for a long time. The most significant challenge for regional rebalancing is to address below average productivity in many of the UK's largest cities, which is caused, in part, by high congestion and poor local transport links.

Most journeys in England are short,[31] and most people who live in cities also work in those cities.[32] But the quality and capacity of the local transport infrastructure for many of these journeys is inadequate. Cities have been congested and car dependent for decades and, in areas across England's regions with growing populations, this has been a constraint on economic growth.

Figure 3: Delay to road travel times (2019)[33]



The most appropriate infrastructure measures will vary according to the characteristics and strategic needs of different places.

In the *National Infrastructure Assessment,* the Commission recommended that government give metro mayors and other city leaders the powers and funding they need to pursue ambitious, integrated infrastructure strategies.

This recommendation requires a move to long term funding settlements for transport within cities, matching the five year settlements for Network Rail and Highways England. The settlements would cover ordinary investment projects and replace short term and fragmented funding streams to give local areas greater control and planning certainty.

In addition, addressing the long standing under provision of urban transport will take sustained investment in targeted priority areas. There is a need for the fastest growing and most congested cities outside London to have access to longer-term funding commitments for significantly larger programmes of investment. The scale of investment required is in the order of £30 billion by 2040, which should be targeted at priority cities and significant enough to deliver major capacity upgrades such as rail tunnels and new public transit systems where these are required.

Locally raised finance, alongside devolved funding, should be part of delivering these transport strategies. The Commission highlighted that at least 25 per cent of funding for any major new projects should be raised locally by the cities that benefit from them. In addition, the government should consider the future role of the new infrastructure bank in supporting the financing of infrastructure development in cities.

Greater local control over funding will also need to be matched by a renewed focus on local accountability. There should be a clear expectation on local leaders that they will take responsibility for effective delivery once budgets have been allocated and will make the choices necessary to prioritise spending within the resources they have available. Expectations also need to be set about provision of land for housing, enabling the growth benefits of infrastructure investment to be realised.

Progress

There are now nine mayoral devolution deals in England, meaning over 37 per cent of England's population will be served by a Combined Authority Mayor and the Greater London Assembly.[34]

As highlighted in the *National Infrastructure Strategy*, the government has made some positive commitments in relation to city transport investment. These include £4.2 billion for intra city transport settlements for eight out of the nine mayoral cities outside London between 2022 and 2027, announced in March 2020. It also includes £5 billion over this parliament to invest in bus services and cycling infrastructure and £3.6 billion to be invested in over 100 town centres and high streets through the Towns Fund launched in September 2019. Lastly, the Strategy also announced a £4 billion cross-departmental Levelling Up Fund that will invest in local infrastructure in England.

Many local areas are taking a lead in putting in place local infrastructure strategies to support growth, with long term thinking about what sort of places they can become and the transport investments that would support their ambitions. The Commission has worked with five local authorities as they developed their strategies and published best practice guidance on local infrastructure strategies learning the lessons from success for others to follow.[35]

While the Commission welcomes the government's moves to enable a more stable planning horizon for intra city transport, the allocations to individual mayors still need to be confirmed to make the most of this reform. The Commission would also like to see five year budgets for cities embedded as a permanent feature through legislation, in line with the protection given to budgets for Network Rail and Highways England.

Additionally, too much funding continues to be allocated on a short term and fragmented basis. Bidding processes for relatively small investments risk obstructing long term strategic thinking by local authorities. It would, in the Commission's view, be better to replace them with more stable devolved funding for local areas.

While progress on devolution is being made, the changes are unlikely on their own to be enough to deliver transformational change. The government has not yet set out long term funding plans on the scale required for cities outside London to make a step change in the performance of their transport networks, addressing the issues with congestion and poor local connectivity that are, in part, holding back productivity.

Large scale infrastructure projects take years to plan and deliver, and the government should be working with local leaders now to identify the priority major urban transport projects for the 2030s, targeted at the fastest growing and most congested cities. The scale of the improvements necessary is substantial, in some places potentially requiring large projects like rail tunnelling or new mass transit systems. Making this happen will need additional funding in the order of £30 billion by 2040, in addition to regular funding streams such as the proposed devolved city settlements.

Such a major increase in funding should not be unconditional – cities that benefit should be expected to raise 25 per cent of costs locally as well as making ambitious progress on land availability for housing. Appropriate governance arrangements for major projects will also be needed reflecting the level of central government support.

The Commission welcomes the government's continued commitment to an integrated plan for jobs, homes and infrastructure in the Oxford-Cambridge arc. At Budget 2020 the government committed to funding Cambridge South Station and examine the case for up to four new development corporations

across the arc. Delivery of the second phase of East-West Rail has started and the alignment of the third phase was announced in early 2020. In its *2019 Annual Monitoring Report*, the Commission urged government to develop a spatial framework for the arc, identifying the locations of new settlements connected to key transport infrastructure. This has not yet happened, although the Commission notes that additional funding was made available at the Spending Review 2020 to enable this work to be progressed. Public consultation ahead of publication of a draft framework will be an important next step.

To make a success of longer term major project commitments and devolved settlements, it may be necessary to consider funding alongside decision making and accountability for local infrastructure strategy and projects. There is a need for a model that is based on long term thinking, stability in policy making and a focus on how well funding meets local needs. Outstanding questions include:

- what is the most appropriate scale and authority level for effective action on infrastructure?
- how can cities be helped to better join up their local infrastructure strategies with policies on skills, housing, and industrial strategy?
- how can government bolster local authorities' powers and responsibilities in relation to raising funds and finance locally for infrastructure spending, including considering wider local tax-raising powers and access to the new infrastructure bank?
- how can authorities be helped on project planning and delivery, including support for cities on developing projects and building local capacity?

These are all questions that should be considered as part of the forthcoming *English Devolution and Local Recovery White Paper*. The Commission stands ready to work with government and local areas on how best to establish a clear framework, providing investment at the scale needed, with decision making and accountability at the local level.

Priorities for 2021

In 2021, the Commission would like to see government:

- set out a pathway to major urban transport investment in the 2030s, with a committed long term funding envelope in the order of £30 billion between now and 2040 including 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
- set out proposals for continuous five year local transport budgets for mayoral authorities in England to continue beyond 2027, along with considering long term funding, decision-making and accountability together to make devolution a success.

The government should also consult on and produce a draft spatial framework for the Oxford-Cambridge Arc.

3. Transport: Road and Rail

Transport plays an important role in economic growth. Well planned, designed and integrated road and rail investment can help reduce carbon emissions and support levelling up across the country.

The government has set out clear plans and multi-year funding for the strategic road network and national rail network. The forthcoming Integrated Rail Plan for the Midlands and North of England provides an opportunity to support local economic growth.

To meet the net zero commitment, the UK's transport systems must reduce emissions. The government's commitment to ban the sale of new petrol and diesel cars and vans from 2030 is a highly significant step. Government needs to build on its funding commitments for electric vehicles and bring forward a delivery roadmap for sufficient charging infrastructure.

There is also an opportunity for government to show the same ambition in its forthcoming freight strategy and set a date for a ban on the sale of new diesel powered HGVs.

Well planned, integrated and low carbon road and rail

Rail

To inform the Integrated Rail Plan, the Commission was asked by government to assess the rail needs of the Midlands and the North to inform government's Integrated Rail Plan. The Commission's *Rail Needs Assessment for the Midlands and the North*, published in December 2020, set out a menu of options for government on how it could integrate, scope and phase HS2, Northern Powerhouse Rail, Midlands Engine Rail and other proposed rail investments, to support economic growth and levelling-up.

The Rail Needs Assessment had four main conclusions:

- there is a strategic case for increasing investment in rail in the North and Midlands
- prioritising regional links between cities is likely to have the highest potential economic benefits overall for the Midlands and the North
- government should help address uncertainty on the costs of major rail programmes by committing to an adaptive approach with an affordable, deliverable, and fully costed pipeline of core investments to improve rail in the Midlands and the North, while continuing to develop further schemes
- to give rail the best chance of contributing to economic transformation in the Midlands and the North, rail investment should form part of a wider economic strategy including skills, development and urban transport.

The Commission's full conclusions and analysis are set out in the *Rail Needs Assessment for the Midlands and the North*.

Roads

In recent years, insufficient funding has led to poor conditions on local roads, affecting road users throughout the country. This creates hazards for road users and increases the long term cost of maintenance. Maintaining roads in high quality condition has been shown to improve energy efficiency and lower carbon emissions for petrol and diesel vehicles.[36]

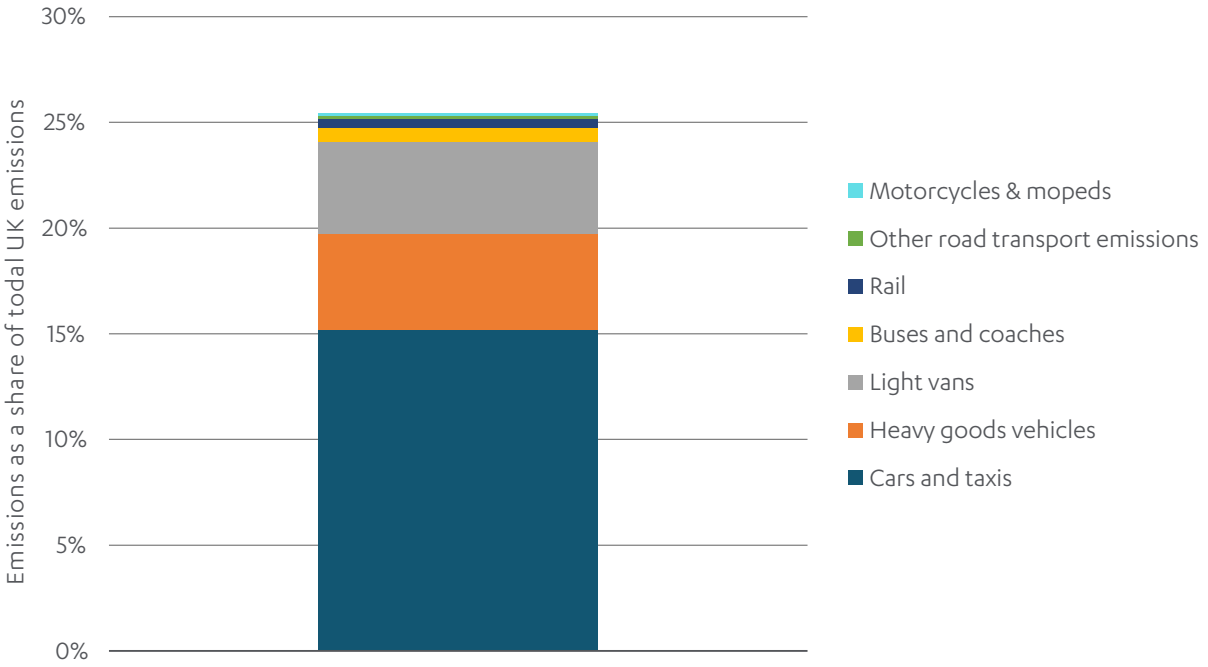
In the *National Infrastructure Assessment* the Commission recommended that government makes £500 million a year of funding available from 2025-26 to 2034-35 for local highways authorities to address the local road maintenance backlog. The Commission did not provide recommendations for 2020-21 to 2024-25 because, when the *National Infrastructure Assessment* was published in 2018, the major funding decisions for transport in the first half of the 2020s had already been made or were shortly to be decided.

Looking forward to the positive changes that new technologies can bring to the road sector, the Commission has recommended that government should establish a centre for advanced transport technology in the Department for Transport to bring together work on technological innovation and ensure its implications are central to future investment proposals. This should include developing and overseeing the Commission's proposed Connected and Autonomous Vehicles framework.

Electric cars and vans

To meet the government's net zero commitment the UK's transport systems must reduce carbon emissions significantly. With almost a quarter of the UK's total greenhouse gas emissions currently coming from surface transport, decarbonising travel by developing lower emission public transport systems and preparing for widescale use of electric vehicles is an urgent priority. Electric vehicles offer a low carbon transport solution, are cheaper for consumers to run, reduce poor air quality, and have the potential to play a role in more efficiently managing the electricity system.

Figure 4: Surface transport emissions as a share of total UK emissions (2018)[37]



The Commission recognised this in the *National Infrastructure Assessment*, recommending that government, Ofgem, and local authorities should enable the roll out of enough charging infrastructure to allow consumer demand to reach close to 100 per cent electric new car and van sales by 2030. To enable this, the core network would need to be in place in the early 2020s to avoid inhibiting electric vehicle uptake. Consumers must also feel confident that they will be able to find a vacant charge point. Providing a visible nationwide network of rapid chargers would give consumers this confidence. The role of government and the regulator in the transition should be largely facilitative: setting direction, removing key barriers, and addressing market failures where they exist. Setting clear goals would allow the private sector to mobilise finance that will deliver most of the charging points needed, and the Commission recommended that government should step in to deliver rapid charge points in rural or sparsely populated areas of the country where the market alone is unlikely to deliver. Charge point infrastructure should not be a barrier to consumers purchasing cheaper lower carbon vehicles.

Getting the interaction between charge points and the electricity networks right is also key. Whilst a visible network of rapid chargers is important, the vast majority of chargers should be slow and smart. This will allow them to play a role in balancing the supply and demand of electricity, lowering bills for consumers across the country. Investment in the network's capacity so that they can accommodate the additional demand from charge points will also be needed.

The Commission recommended that Ofgem both 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.

Freight

Increases in just-in-time manufacturing processes and the popularity of online shopping mean the UK freight transport sector is set to grow considerably. Currently 1.6 billion tonnes of goods are moved around the UK each year,[38] and over the next 30 years demand for heavy and light freight transport is expected to increase significantly. This has major implications for how the UK tackles emissions and urban congestion: projections suggest road and rail freight might contribute as much as 20 per cent of the UK's residual greenhouse gas emissions by 2050, if action is not taken.[39] In *Better Delivery: the challenge for freight*, the Commission recommended that new diesel HGV sales end by 2040 as part of efforts to help freight become carbon free by 2050. Freight logistics must also be considered earlier in the planning system, to ensure infrastructure and better design solutions are available to tackle emissions and reduce congestion.

Progress

Rail

In February 2020, the government published the independent Oakervee review of the High Speed 2 rail project and announced plans to proceed with High Speed 2. Main civil engineering construction works of Phase 1 from London to the West Midlands began last April. This gave a renewed statement of intent by the government for high speed rail investment in the UK, demonstrating long term planning.

At the same time, the government announced[40] its intention to draw up an Integrated Rail Plan for the North and Midlands, to identify a way forward on scoping, phasing and sequencing delivery HS2 Phase 2B, Northern Powerhouse Rail, Midlands Rail Engine and other rail investments.

The Commission expects that the forthcoming Integrated Rail Plan will bring clarity and stability to rail planning and has provided input via its Rail Needs Assessment, as set out above.

Roads

In England, over 90 per cent of trips are made by private modes of transport which use the road network; the remaining trips made by public transport are also highly dependent on the road network for some or all of the journey.[41] Spending on routine local road maintenance in England decreased year on year between 2010-11 and 2018-19.[42] Under investment in road maintenance has continued over the years since the *National Infrastructure Assessment*.

The Spending Review has committed £1.125 billion of funding for local roads maintenance in 2021-22, including £500 million from the £2.5 billion Potholes Fund announced in the March 2020 Budget to fix potholes and resurface roads over the next five years. This is a welcome injection of funding to help address the most pressing maintenance demands in the short to medium term. However, the Commission would like to see this level of investment sustained over a longer period. A longer term funding plan in the order of £5 billion over the period between 2025 and 2035 for repairing the backlog of potholes would allow local authorities and the construction industry to plan and resource efficiently.

Technological change has the potential to radically change driving patterns and vehicle ownership in the years ahead. Environmental considerations will also have implications for the design and usage of the road network.

Over recent years the government has taken a number of positive steps to help prepare the country for new and disruptive transport technologies. These include the establishment of the cross departmental Future of Transport Programme as part of the government's Industrial Strategy, and Highways England's 2020-25 road improvement funding streams, which totals £936 million and includes the Innovation and Modernisation fund that supports research into the latest technologies proposed for the road network.

The Commission also welcomes the increase of UK Research and Innovation's annual funding budget to £2 billion from this year to support higher education research and to support Innovate UK, the UK's innovation agency, to develop new ideas. There is a need for a well-focused and coordinated effort by government to investigate advanced roads and transport technology.

The Commission will consider strategic questions about the long term road network as part of the next National Infrastructure Assessment.

Electric cars and vans

In *The Ten Point Plan for a Green Industrial Revolution*, the government committed to phasing out the sale of new petrol and diesel cars and vans by 2030. The government has followed the direction set out by the Commission in the *National Infrastructure Assessment* and this is welcome. The target demonstrates a commitment to change commensurate with the net zero challenge in transport and provides regulators and industry with a clear long term goal.

The government has begun to set out what a nationwide network of rapid chargers could look like. It has committed £1.3 billion of public funding to kick start electric vehicle charging infrastructure. Government has also published a vision for the rapid charge point network in England, setting out an ambition to deliver 2,500 high powered charge points on motorways and A roads by 2030, increasing to 6,000 by 2035. This is key to giving consumers the confidence to purchase electric vehicles and represents a significant increase in the number of rapid chargers currently deployed.

However, concerted action will be needed over the next five years to quickly scale up the network so that it can meet the emerging demand. More detailed plans for the roll out of charge points with clear milestones are now needed.

The government has also endorsed the Commission's recommendation on ensuring that electric vehicle charging can support the operation of the energy system and confirmed that it intends to mandate that all private charge points must be smart. This will bring benefits not only to drivers but to all electricity consumers.

The government and Ofgem have acknowledged the role that the regulator must play in facilitating longer-term investment in the electricity networks to support charge point installation. Government fully endorsed the Commission's recommendation that Ofgem should work with charge point providers to identify any potential anticipatory investment needed and has written to Ofgem to stress the importance of facilitating the deployment of electric vehicles in the coming price controls. Ofgem has also recognised, in its *Decarbonisation Action Plan*, that the electricity grid may need to be strengthened to accommodate electric vehicles. The Commission hopes that the upcoming price controls facilitate the investment in distribution networks required to support the efficient deployment of electric vehicles charge points.

Freight

While the Government has made good progress on the decarbonisation of cars and vans, it has made less progress on the decarbonisation of HGVs. No commitments have yet been made regarding the phase out of diesel HGVs, but the government has said it will consult on the subject this year.

There is an opportunity for government to demonstrate the same level of ambition it has shown with cars and vans by giving industry a clear goal for ending the sale of diesel-powered HGVs. The recently established Freight Council fulfils one of the Commission's recommendations from its *Better Delivery: the challenge for freight* report and should be a useful forum through which to reach consensus and co-ordinate action.

The Commission notes that the government's guidance issued to local authorities in July 2019 on how to determine and allocate space for logistics in new developments should help reduce energy, emissions and congestion. The *National Infrastructure Strategy* mentions the ongoing work to further develop freight tracking and mapping tools should also lead to reductions in these areas.

On rail freight, Network Rail's Traction Decarbonisation Network Strategy Interim Business Case, published last July, has identified what may be required to decarbonise the rail network by 2050. The forthcoming cross-modal freight strategy must be developed alongside Network Rail's regional delivery plans to provide a clear roadmap for decarbonising rail freight by 2050.

Priorities for 2021

In 2021 the Commission hopes to see government:

- publish a comprehensive cross-modal freight strategy with a firm commitment to phase out diesel HGVs by 2040 along with detailed decarbonisation plans consulted on with the road haulage and logistics industry
- produce a delivery roadmap for electric vehicle charging infrastructure to meet the 2030 end to new diesel and petrol car and vans sales including ensuring that future price controls facilitate the necessary investment in the electricity grid.

4. Digital and Data

The restrictions imposed as a response to the Covid-19 pandemic have underlined how essential reliable and good quality broadband connectivity is to the UK. With online shopping surging, increased levels of home working and schooling, and growing use of online entertainment, a fast and consistent service is now seen as a vital part of everyday life.

The government has set out a clear vision and funding to deliver gigabit capable broadband to a minimum of 85 per cent of UK premises by 2025. The government now needs to set out a clear plan with milestones and funding for the roll out of broadband to the final 20 per cent of households as soon as practicable, to meet the policy goal of nationwide access to high speed, reliable broadband.

Further work is also needed on the government's vision for 5G and, while detailed plans have been developed for the National Digital Twin Programme, government is yet to provide the necessary funding commitment.

Delivering futureproof digital connectivity across the UK

Broadband

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

To accelerate rollout, the Commission recommended that Ofcom should promote network competition through deregulation where possible, and 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.

Mobile and 5G

The Commission has previously stressed the importance of mobile connectivity both in *Connected Future*, published in 2016, and the *National Infrastructure Assessment*. The Commission recommended the expansion of 4G coverage to all UK roads and rail and argued that the government must support a fast rollout pace for 5G, which will become an integral part of industries developing around internet and cloud-based applications and services, and deliver benefits across a range of sectors, such as manufacturing and health.

Data for the public good

The Commission has previously highlighted the value of data in infrastructure in *Data for the public good*, published in 2017. Most importantly, it set out a roadmap towards a National Digital Twin in order to improve monitoring and management of the UK's infrastructure.

Progress

Broadband

Digital connectivity is improving overall and at a faster pace than anticipated by the Commission in 2018.[43] 97 per cent of UK premises now have access to superfast broadband. 38 per cent of UK premises now have access to gigabit-capable broadband (any broadband technology capable of delivering speeds of one gigabit per second), and 20 per cent to full fibre (broadband technology in which fibre optics are used to connect a customer's terminal). Gigabit and full fibre reached just four per cent of UK premises when the National Infrastructure Assessment was published.[44] This growth is, in part, the result of network competition between incumbent and new players driving investment, and a more supportive policy and regulatory environment.

In the *National Infrastructure Strategy*, the government set out its goal to deliver a minimum of 85 per cent gigabit capable coverage by 2025, and to seek to accelerate rollout further to get as close to 100 per cent as possible. The 85 per cent target is challenging but achievable if the right policy and regulatory conditions are in place.

Government has endorsed the Commission's recommendations for telecommunications regulation, but further progress is needed in 2021 to accelerate coverage. The government needs to overcome remaining policy barriers to deliver its goal which assumes that the private sector delivers gigabit broadband to around 80 per cent of premises. The measures include completing the reform of building regulations to require new homes to be built with gigabit broadband and changing the wayleaves' regime to create a faster, cheaper application process for operators to gain access to properties with unresponsive landlords.

Alongside policy reforms, Ofcom needs to set out this year a new, long term regulatory framework that incentivises network investment by enabling a fair return. There must also be scalable access for alternative network providers to Openreach's passive infrastructure to support network competition.

The main challenge for nationwide full fibre coverage is delivering to the hardest to reach 20 per cent of UK premises, which are predominantly located in remote rural areas and are commercially challenging for providers.

The government has pledged £5 billion to subsidise delivery to the hardest to reach 20 per cent of UK premises. The government plans to spend £1.2 billion of this £5 billion between 2021 and 2025 as part of the roll out to achieve the 85 per cent target, and is currently consulting on its procurement strategy, suggesting it will prioritise those premises that do not yet have access to superfast broadband.[45] This suggests around one million premises in hard to reach areas are covered by the government's proposed plans.

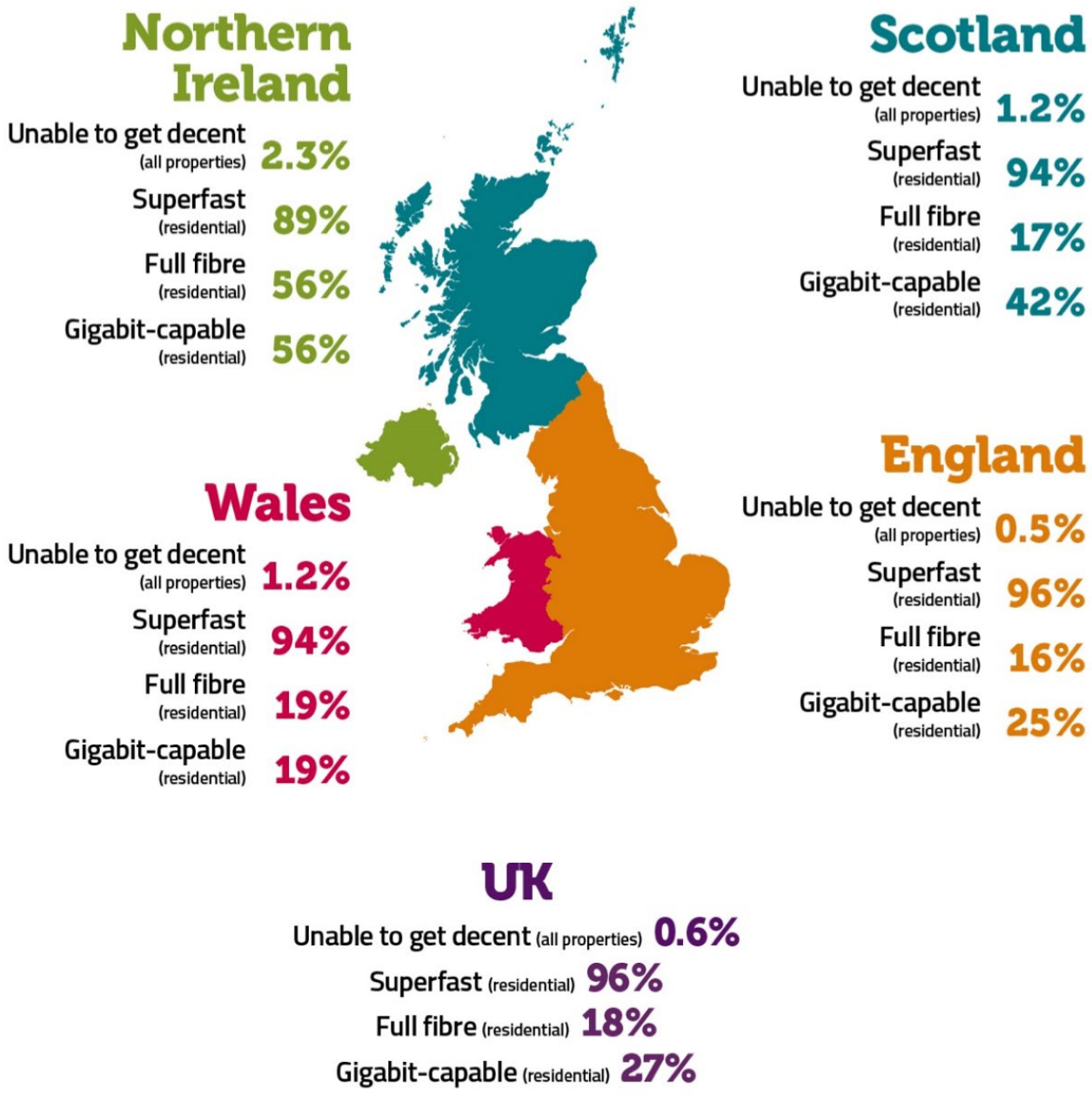
Government has yet to set out plans to connect the remaining premises that will not be reached by 2025 under current proposals. This may lead to up to a large majority of hard to reach premises being left behind after the rest of the UK already has access to gigabit broadband in 2025, creating a new digital divide.

Mobile

Overall, 4G mobile coverage of UK landmass continues improving and now stands at 91 per cent of UK landmass covered by at least one operator. 4G mobile coverage of UK landmass exclusively by each operator ranges from 79 to 85 per cent, but coverage outside premises has reached 98 to 99 per cent.

The Commission welcomes the Shared Rural Network agreement between the four mobile network operators and DCMS, which is targeting a 95 per cent UK landmass 4G coverage by at least one operator. This will also ensure that most UK roads are covered by 4G by 2025. In 2021 the government should continue working with Ofcom and mobile network operators to deliver the Shared Rural Network targets for 4G.

Figure 5: Summary of mobile coverage across the UK and nations[46]



The UK must realise its potential to lead in 5G in order to ensure it takes early advantage of the technological applications enabled by it. 5G rollout continued progressing during 2020 and is now present in most major UK towns and cities, however, it is still mostly limited to parts of city centres. In *Connected Nations 2020*, Ofcom reported that 5G is carried on around 3,000 mobile base stations, which is a ten-fold increase compared to December 2019[47]. However, it is not possible to say what this means in terms of how much landmass is covered, or how many premises. The government and Ofcom must work with the mobile network operators to identify suitable metrics and begin measuring actual 5G coverage and set ambitious targets for an accelerated 5G rollout.

Data for the public good

Following the Commission's recommendations to develop an information management framework to further the vision of the National Digital Twin in *Data for the public good*, HM Treasury endorsed these recommendations in 2018 and in the *National Infrastructure Strategy*, setting out how better use of data can enable better decisions. The Centre for Digital Built Britain, a partnership between BEIS and Cambridge University, set out a roadmap to enable the development of the National Digital Twin in 2019,[48] and in 2020 published the Pathway to the Information Management Framework.[49] The National Digital Twin programme continues to gain momentum and support amongst industry, academia and government. 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*. The government should commit the necessary funding in the spending review.

Priorities for 2021

In 2021, the Commission would like to see government and Ofcom continue to work with industry to accelerate network roll out in order to achieve nationwide coverage of gigabit connectivity as soon as possible. It should be possible to match the fastest build rates that have been achieved in European countries, such as Spain and France, if the right conditions are in place. The policy and regulatory levers are known; the challenge is to execute them at pace.

In 2021, the Commission would like to see government:

- set out a clear plan with milestones and funding for delivery of high-capacity broadband to the hardest to reach 20 per cent of UK premises.

5. Design and Funding

Efficient use of public and private money combined with sound design principles will deliver better outcomes for society. Long term decisions and major projects inevitably carry risks, but decision making can be improved at every stage of infrastructure development through robust financial monitoring and prioritising good design.

Strong commitments from government are necessary to deliver policy objectives on economic recovery, levelling up and achieving net zero:

- **public investment over the long term**
- **the establishment of an infrastructure bank to crowd-in private investment**
- **improved decision making.[50]**

These commitments are particularly crucial given that a significant proportion of economic infrastructure is privately financed.[51] Changes to regulation (see chapter seven), are also necessary.

Funding, financing and designing infrastructure

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*.[52]

The Commission recommended that government establish a new operationally independent infrastructure finance institution, designed around three key building blocks:

- sound banking
- additionality
- economic and social impact.

The Commission recommended design should be embedded into the culture of infrastructure planning. It recommended that nationally significant infrastructure projects should have board level design champions and use design panels to make sure good design is prioritised from the early stages of a project, provide a continual emphasis on that design vision throughout and hold board members and project management to account for delivering those design objectives. Design panels should have regard to a set of design principles that the Commission committed to produce.

Better decision making requires improving project appraisal. The Commission recommended the government should publish good quality data on infrastructure costs and performance. All public bodies taking decisions on strategic economic infrastructure should publish the forecast costs and benefits of their major infrastructure projects at each appraisal stage and at a suitable point after completion.

Progress

Funding and finance

The *National Infrastructure Strategy* and the *Spending Review 2020* made significant progress against the Commission's recommendations on funding and financing and represent a substantial investment in UK infrastructure in the near term. In the *Spending Review 2020*, the Chancellor confirmed that capital spending in 2021-22 will total £100 billion, £27 billion of which will be allocated for economic infrastructure. This in line with the upper end of the Commission's fiscal remit for next year and is a substantial increase compared to recent years where spending has been closer to 0.9 per cent of GDP.[53]

The government's commitment does not reflect the exact balance of funding across the fiscal remit recommended in the *National Infrastructure Assessment*. However, it is broadly aligned with the funding priorities that the Commission set out for the near term. In some areas, such as flood defences, the government is planning to invest more than the Commission recommended, and in others investment is slower, for example in ensuring that gigabit broadband reaches hard to reach areas.

Multi-year budgets have been allocated to a number of projects including an £18 billion investment in England's strategic roads through to 2024-25 and £17.5 billion to Network Rail to renew and upgrade the railway system through to the end of Control Period 6 in 2023-24 – although the latter represents a reduction in funding for rail enhancements compared to earlier Control Period 6 estimates. The £4.2 billion funding for multi-year local transport settlements in eight city regions is also welcome. However, as set out in chapter one, settlements for individual cities need to be allocated as soon as possible.

The government has committed to review the fiscal remit in 2021 to ensure it reflects the government's long term ambitions, and to maintain the fiscal remit at a minimum of 1 – 1.2 per cent of GDP in the meantime. The Commission looks forward to engaging in that review.

The Commission welcomes the government's commitment to establish an infrastructure bank and looks forward to the establishment of the bank in spring 2021. The bank should have a mandate set by government and a governance structure that supports operational independence in order to foster investor confidence. These factors will be critical to enabling the bank to deliver the infrastructure investment needed both for the recovery of the UK economy and to support its long term growth potential. The Commission looks forward to working with the government to build an effective relationship with the new bank.

Design

Since the publication of the Commission's design principles in February 2020, organisations which already had design principles, such as Network Rail, have ensured their principles align with the Commission's.[54] The Commission was pleased to see the government welcome the principles in the *National Infrastructure Strategy* and its commitment to embedding good design in all infrastructure projects.

The government endorsed the recommendation for major national infrastructure projects to have a board level design champion supported by a design panel. Design champions and panels will make sure good design is prioritised from the early stages of a project, provide a continual emphasis on that design vision throughout, and hold board members and project management to account for delivering those design objectives.

The Commission was pleased to see that its recommendations on the use of design champions and the Commission's design principles are to be embedded in the delivery support and assurance regime – overseen by the Infrastructure and Projects Authority – for scrutiny throughout the project life cycle.[55]

The government has said that it "expects all infrastructure projects to have a board level design champion in place by the end of 2021 at either the project, programme or organisational level."[56] This goes beyond the Commission's recommendation, which was only in relation to nationally significant infrastructure projects. The government also says that champions should be supported by design panels where appropriate. Given the broader range of projects now captured by the government's commitment to board level champions, this is understandable. The challenge is now to ensure that these changes happen and become firmly embedded in infrastructure projects.

Project cost and performance information

The Commission was pleased to see the government endorse its recommendations on cost and performance data in the *National Infrastructure Strategy*. In particular, the Commission welcomes the government's position on greater transparency around the appraisal and decision-making process for major infrastructure projects, which was set out in response to the National Infrastructure Assessment recommendations and is a significant step. Greater transparency will build capability by demonstrating what good looks like, which will be critical to embedding the changes set out in the government's review of the Green Book.

From April 2021, the *National Infrastructure Strategy* sets out a new requirement for all infrastructure projects in the government's Major Projects Portfolio to publish cost and performance data at three stages of their life cycle:

- a summary of their business case within four months of receiving final approval
- a close out report within six months of completing construction, reporting the outturn cost and schedule and identifying best practice and lessons learned to apply to future projects
- an evaluation of the long term economic and social benefits of the scheme between five and ten years after project completion, working with the Commission to build the evidence base for future National Infrastructure Assessments.

The Infrastructure and Projects Authority will establish a new benchmarking hub and data platform in 2021.[57] This will give projects access to actual outturn cost and performance data from similar projects to use when developing their own estimates, meaning they are more likely to be realistic and achievable.

Priorities for 2021

In 2021, the Commission would like to see government:

- ensure the bank is operational in an interim form from spring 2021, so it can support infrastructure projects to help meet the objectives of economic recovery, net zero and levelling up.

Government should also set out a long term commitment to infrastructure at the next Spending Review and continue to commit multi-year budgets to key infrastructure programmes.

The Commission will work closely with the Infrastructure and Projects Authority as it develops its guidance and processes to reflect the new requirements on data and on design.

6. Water and Floods

Infrastructure can deliver a safe and reliable water supply and improved flood resilience to keep pace with a changing climate and growing population. With extreme weather events such as floods and drought more likely in future years, cities, towns and villages need to be prepared. Currently one million homes in the UK have more than a one per cent chance of flooding in any given year, and there is a one in four chance of a severe drought before 2050.[58] Similarly, the demands on England's water and wastewater systems are increasing as the population grows.

The Commission has observed a transformation in how government, the regulators and industry work together to manage and plan for water resources and tackle drought risk, driven by a shared recognition of the challenges highlighted by the Commission's recommendations. This progress now needs to be matched by a strategy to deliver a reduction in per capita demand for water.

The Commission welcomes the £5.2 billion that the government will invest in flood risk management over the next six years and the shift towards catchment-based planning for flood mitigation. However, the government needs to build on its flood policy statement and the Environment Agency's strategy to be clear *how* and by *exactly how much* it will set measurable goals for increasing that resilience. Recognition of the need to protect and prepare communities is paramount.

Increasing resilience to drought and flooding

Drought

Climate change and population growth put increasing pressure on England's water: there is a one in four chance of a serious drought before 2050. Boosting drought resilience costs half the alternative of relying on emergency measures (saving up to £20 billion over the next 30 years).[59]

To avoid the risk of severe drought, the Commission's analysis suggested that additional water supply and demand reduction totalling 4,000 million litres per day should be delivered by 2050. This would avoid the risk of water shortages and ensure that the public water supply can withstand an extreme drought (i.e. a drought with 0.2 per cent annual probability).

The Commission recommended a twin-track approach of managing demand and enhancing supply to reduce the risk of drought. This can be achieved by the government, regulators and water companies working together to deliver a national water transfer network and additional supply by the 2030s, halving leakage by 2050 and better managing demand.

Flooding

The Commission recommended that government should set out a long term strategy to deliver a nationwide standard of resilience to flooding with an annual likelihood of 0.5 per cent by 2050 where this is feasible. A higher standard of 0.1 per cent should be provided for densely populated areas where the costs per household are lower and there is a greater risk of flooding overwhelming a wide range of services.

To deliver a long term strategy the Commission recommended that the government should put in place a rolling six year funding programme, that the Environment Agency should update plans for catchments and coastal cells by the end of 2023 to identify how risk can be managed most effectively, and that new developments should be resilient to flooding and not increase risk elsewhere. The Commission also recommended that water companies and local authorities should work together to publish joint plans to manage surface water flood risk by 2022.

Progress

Drought resilience

The Commission welcomes the step change in approach to planning for drought which followed the publication of its recommendations. The government has agreed with the Commission's recommended level of drought resilience and the Environment Agency has set out the scale of action needed in its National Framework for Water Resources.[60] The water industry has also established five regional groups which are assessing the future predicted supply deficit, and developing the best mix of solutions to meet it.

Water transfers and other new infrastructure such as reservoirs will meet around one third of the 4000 million litres per day deficit the Commission identified. The water regulators' alliance for progressing infrastructure development will allow for improved development and future delivery of strategic supplies and transfers. The Commission welcomes the £469 million allowance that Ofwat made in the last price review to further develop a range of strategic schemes identified by the companies. This should ensure the best mix of strategic schemes are developed to the point they are 'shovel ready' from 2025.

At the last price review the industry committed to reduce leaks by an average of 16 per cent by 2025 and has signed up to halve leakage by 2050. This represents a step change compared to the last decade or so and will meet around a third of the future 4,000 million litres per day deficit the Commission identified. It is too early to report progress in the current investment period, but the most recent report levels show a seven per cent reduction on average for the year to March 2020,[61] a positive sign of companies rising to the challenge.

The final third of the 4,000 million litres per day deficit should come from improvements to water efficiency and reductions to the amount of water which is consumed. The National Framework for Water Resources uses a planning assumption of 110 litres per person per day that can be saved. This compares favourably with the 118 litres per person per day that the Commission assumed could be achieved by 2050. However, the government has not yet set out what steps it will take to support the water industry achieving significant reductions in per capita consumption. It has not endorsed the Commission's specific recommendation supporting greater use of compulsory metering. It has committed to publishing its next steps in response to the consultation in held on water efficiency in 2019.

Flood resilience

In its *Flood and coastal erosion risk management policy statement* the government has set out how it plans to make the nation more resilient to floods.[62] It agrees with the Commission about the need to build resilience everywhere but does not agree with setting national standards. The government argues that agreeing national standards would be complex and require considerable work. It also argues that the existing different levels of flood resilience that already exist across the country require a more tailored local approach when setting standards.[63] The Commission still believes there is a case for national standards which would support a more strategic and integrated approach to flood management across catchments and support levelling up across the country. The House of Commons Select Committee for Environment, Food and Rural Affairs has called on the government to provide greater certainty about its long term objectives for flood resilience.[64]

In the absence of standards to set a long term ambition, the government has set out a commitment to develop, by spring 2022, a set of national indicators to monitor trends and local conditions so that progress in increasing resilience can be measured. There is a danger that these will only report retrospectively on progress, but they could form the basis of clear and measurable goals for each area.

The Commission welcomes the government's commitment to double its investment in the flood and coastal defence programme, so that £5.2 billion will be invested over the next six years. Whilst this is not the rolling six year programme recommended by the Commission, it is above the investment the Commission proposed for these years. There is a strong case for government continuing to set multi-year investment programmes to avoid a return to reactive funding where budgets are reduced only to increase again following flood events.

The Environment Agency is reviewing flood risk management plans in its normal cycle so revised plans will be available from 2021. The government's policy statement also outlines its commitment to transform local flood and coastal erosion risk planning so that all areas will have strategic and comprehensive plans by 2026. This goes some way to meeting the Commission's recommendation to update all plans for catchments and coastal cells by the end of 2023, but without the focus of a national standard.

The Commission welcomes the government's endorsement of its recommendation that water companies and local authorities should work together to publish joint plans to manage surface water flood risk by 2022. The continuing development of the first round of Drainage and Wastewater Management Plans is a vital part of developing a joint approach to managing surface water flood risk, and the approach to put future rounds of plans on a statutory basis as part of the Environment Bill is welcome. The Commission awaits with interest the government's further action from 2018's *Surface Water Management Action Plan*,[65] and its final response to last year's review of responsibilities for surface water and drainage.[66]

It is also positive to see that the *National Planning Policy Framework* has been revised to clarify the planning safeguard in place. The Commission welcomes the commitment, in the Floods Policy Statement and last year's Planning White Paper,[67] to further review the policy for building in flood risk areas. The Commission hopes that the opportunity afforded by these proposed reforms will further strengthen the resilience of new properties and infrastructure to flooding and coastal erosion.

Priorities for 2021

In 2021, the Commission would like to see government and industry keep up the momentum they have shown in relation to water resource planning. The Commission hopes to see real progress on measures to reduce water consumption starting with publication of the government's next steps on water efficiency to support a reduction in per capita water demand.

The Commission would also like to see government make significant progress on developing its suite of national indicators to measure progress on increasing flood resilience.

7. Regulation and Resilience

Climate change and population growth are two significant challenges that the UK must prepare for. These issues require clear strategic direction and long term policy objectives from government, as well as a regulatory system that supports these objectives. To deliver goals such as net zero the regulatory system must also be able to facilitate greater investment in a strategic way, and public and political confidence in the regulatory system must be improved. Regulation must also be flexible to the technical requirements that come with new technologies, innovations and energy mixes.

The government has responded to the Commission's recommendations to improve regulation and will set out further details in 2021. The Commission welcomes the commitments made so far and hopes government will strengthen and update the UK's model of regulation by providing clear strategic direction, new duties to reflect new challenges, and facilitate greater competition in strategic enhancements to water and energy networks.

The government has committed to respond to the resilience study – *Anticipate, React, Recover: Resilient infrastructure systems* – in 2021. The events of the previous year have highlighted the importance of these issues and the Commission looks forward to the government's timely response to the recommendations in the study.

Adapting regulation and resilience to meet new challenges

The Commission's regulation study, *Strategic Investment and Public Confidence*, considered economic regulation in the energy, digital telecoms and water sectors. The report made several recommendations, including:

- government should set out its strategic priorities for infrastructure to help meet the country's long term needs
- increased use of competition should be used to drive innovation, including by separating consideration of major strategic investments from price control processes in the energy and water sectors
- regulators' duties should cover price, quality, resilience and environment, and require them to seek to collaborate with other regulators
- government should introduce legislation to ensure that regulators have regard to endorsed recommendations from the Commission
- that government address the past failure to set out distributional preferences when regulatory proposals are made with significant distributional consequences

- regulatory frameworks should reflect the devolution of powers within the UK
- the UK Regulators Network should have a stronger role – supported by an independent chair.

The Commission published *Anticipate, React, Recover: Resilient infrastructure systems* in May 2020, looking at the resilience of infrastructure across the digital, energy, road, rail and water sectors. The study proposed a new framework to help policy makers, regulators and operators focus on resilience and drive improvements. The framework is based around six key aspects of resilience, setting out how infrastructure systems need to be able to anticipate, resist, absorb, recover, adapt and transform to shocks and stresses.

It also made a series of recommendations to government, aligned with this framework, to help maintain truly resilient infrastructure systems. Firstly, that government should publish a full set of resilience standards every five years along with an assessment of any changes needed to deliver them, so that shocks and stresses are better prepared for in advance ('anticipate'). Secondly, that infrastructure operators should carry out regular and proportionate stress tests, to ensure standards are met and that actions are taken to address vulnerabilities ('resist, absorb, recover'). Finally, to ensure they are able to meet future challenges, that infrastructure operators should develop and maintain long term resilience strategies ('adapt, transform'). As part of this, regulators should ensure their determinations in future price reviews are consistent with resilience standards.

Progress

Regulation

The government is committed to a long term approach to investment to provide predictability and the required stability, as well as appropriate incentives, to investors. The *National Infrastructure Strategy* agreed with the Commission's primary finding that the UK's system of economic regulation is working well but needs updating in some areas to address new challenges. In 2021, government will publish an overarching policy paper providing more clarity on their position.

The Commission welcomes the commitment in the *Energy White Paper* to a Strategy and Policy Statement for Ofgem which will set out a clear strategic direction and specify priorities to provide greater clarity for the regulator, investors and consumers.[68] This will bring energy in line with water and telecoms where the government has set out a strategic direction for regulation.

The government's policy document must a route map for meeting the rest of the recommendations which includes legislative change. This should include introducing duties to ensure regulators' decisions are consistent with the net zero commitment, and, where needed, promote the resilience of infrastructure systems. It should also set out how to remove any barriers to the use of competition in the provision of strategic enhancements to water and energy networks. The Commission would welcome greater consideration of an aligned collaboration duty for each regulator to provide a holistic view on customer impact. Finally, the policy paper should clearly set out how regulators should consider Commission recommendations endorsed by the government, to provide clear and consistent direction for regulators.

Additionally, the Commission notes the publication of the John Penrose review on how to bolster UK competition policy which we expect to complement the Commission's recommendations.[69]

Resilience

In the *National Infrastructure Strategy*, the government agreed there is a need for an increased focus on infrastructure resilience. The *National Infrastructure Strategy* commits the government to responding to the resilience study in early 2021.

Priorities for 2021

In 2021, the Commission would like to see government:

- develop a road map enabling regulators to legislate for net zero and collaboration duties and creating mechanisms to introduce more competition which would facilitate strategic investment and innovation in water and energy
- respond to the Commission's resilience recommendations, including the resilience duties originally recommended in *Strategic Investment and Public Confidence*.

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