

# ICE Green Paper: What should be in the second National Infrastructure Assessment?

August 2021

## Executive summary

The National Infrastructure Commission's (NIC) National Infrastructure Assessment (NIA) is a cornerstone of the UK's strategic infrastructure planning regime. The first NIA was released in July 2018 and represented the first cross-sector assessment of its kind in the UK.

The second NIA will explore changes to the policy and demand drivers that underpinned the first and is due for publication in the second half of 2023. Key themes identified by the NIC so far include net zero, levelling-up and climate resilience.

The assessment is a thorough process – work is underway now by the NIC to create a baseline assessment of the current state of key infrastructure sectors. The baseline assessment will be published for consultation later this year, alongside the NIC's proposals for the strategic themes and main priorities it will explore as part of the second NIA.

The complexity of the UK's long-term infrastructure needs is unprecedented and uncertainty regarding this long-term need has grown since the publication of the first NIA. Most notably, the UK has enshrined in law a commitment to reach net-zero greenhouse gas emissions by 2050, which will require enormous changes to our infrastructure systems, some of which will utilise technology that is currently at low levels of maturity.

Additionally, while many longer-term impacts remain unknown, the Covid-19 pandemic has, in all probability, changed the demand profile for infrastructure and could lead to behavioural changes that affect many core infrastructure sectors.

Some things have perhaps not changed, but become more urgent since the first NIA. The effects of climate change are becoming more evident, with increasing extreme weather events likely to impact the infrastructure sectors that serve the public, with greater expectations regarding resilience, reliability and acceptable service levels under these more extreme conditions.

Each of these factors will place new and challenging demands on the UK's infrastructure, from the way we travel and the frequency of our journeys, through to our energy-generating capabilities and consumption habits, water provision and resilience to the effects of climate change.

At this early stage in the second NIA's process, ICE is keen to gather evidence and views from infrastructure professionals and civil engineers across a short number of key questions:

**Question 1:** Which assumptions around future demand, which sat behind the first NIA, are still valid? And which need fundamental review?

**Question 2:** Within each of the three currently identified themes for the second NIA (net zero, levelling-up, climate resilience), what should be the core considerations for infrastructure by sector and region?

**Question 3:** Are there other issues outside these three themes that should be explored in the second NIA to deliver against the NIC's objectives?

**Question 4:** How can the second NIA move the UK closer to achieving the Sustainable Development Goals through infrastructure interventions?

The consultation will close on **Friday 3<sup>rd</sup> September 2021**.

The findings from responses to this Green Paper will support ICE's submission to the NIC's autumn consultation on their emerging thinking. The findings will also be analysed alongside concurrent ICE work on pathways to decarbonisation and defining and measuring the outcomes from levelling-up. This will be formed into a policy paper, with recommendations and areas that the second NIA should consider.

## Background

The NIC was established in 2015 to provide independent, impartial advice on the UK's long-term infrastructure needs. The NIC is required to carry out an overall assessment of the UK's infrastructure requirements once in every Parliament. However, the turbulent political landscape since the NIC's inception has meant this has been impossible – in practice, the NIC is working to a cycle of an assessment every five years.

The first National Infrastructure Assessment was published in July 2018 and set out a clear, long-term strategy for the UK's economic infrastructure from 2020 to 2050, covering transport, energy, water and wastewater, flood resilience, digital connectivity and solid waste.<sup>1</sup>

The NIA provided a unique opportunity for infrastructure policy to be set against an impartial and expert evidence base, enabling the delivery of the infrastructure that the nation requires in order to prosper and meet national strategic objectives.

The NIA's narrative set out policy recommendations under seven broad headings:

- Building a digital society
- Low cost, low carbon
- Revolutionising road transport
- Transport and housing for thriving city regions
- Reducing the risks of drought and flooding
- Choosing and designing infrastructure
- Funding and financing.

The policy recommendations drawn from the NIA fed through into creating a National Infrastructure Strategy (NIS), released by the UK Government in November 2020.<sup>2</sup> The NIS was a significant milestone in the UK's strategic infrastructure planning approach, representing a holistic plan for optimising the many benefits that we already know good infrastructure generates for the UK.

<sup>1</sup> National Infrastructure Commission (2018) [National Infrastructure Assessment](#)

<sup>2</sup> HM Treasury (2020) [National Infrastructure Strategy](#)

The NIS was published alongside a commentary detailing the government's response to each part of the NIA.<sup>3</sup> However, the NIS did not adopt all of the NIA's recommendations. Notable areas where the government did not endorse the NIA's recommendations include:

- the steps needed to achieve 100% electric new car and van sales by 2030
- the role of local authorities in making available electric vehicle charge point parking spaces
- a significant increase in funding for local highway authorities
- additional powers for mayors to deliver joined-up strategies for transport, employment and housing
- a significant increase in transport funding, over regular five-year cycles, for cities.

While some of these recommendations have been partly addressed by commitments in the government's recent Transport Decarbonisation Plan,<sup>4</sup> others remain outstanding and, as a result, a policy gap remains where action by the government will be necessary. Government documents addressing heat in buildings and hydrogen are expected to be published in the next few months.

## Learning lessons from the first NIA

As the first NIA represented an approach that had not been undertaken at a national level before in the UK, the NIC completed a 'lessons learnt' review shortly after its publication, informed by stakeholder views.<sup>5</sup>

While feedback from the process was broadly positive, the NIC identified several areas to improve upon in undertaking the second NIA. These included:

- taking a more cross-cutting approach to the NIA, particularly where recommendations sit across multiple government departments, regulators or other bodies
- better management of stakeholder responses, including exploring whether there are efficient methods of communicating to stakeholders how their input has been used
- a review of how to engage most effectively with the NIA expert advisory panels in order to increase their opportunities to input and challenge work
- outlining the NIC's objectives more prominently in external communications in order to explain the link between the second NIA's recommendations and how they support the NIC's objectives, as well as the trade-offs required.

A recent ICE review of the UK's strategic infrastructure planning regime found that the NIA provided foresight to industry, allowing them to improve planning for investments and staff development to align with the expected investment pipeline.<sup>6</sup>

While at the time of its publication in 2018 there was no guarantee the government would adopt the NIA, the transparency it provided regarding the potential pipeline was beneficial to firms, particularly in the consultancy market, the labour market, financial institutions and wider supply chain. The NIA also fostered a better dialogue between built environment firms and the government on major schemes and how to plan for their implementation, enabling preparatory discussions.<sup>7</sup>

<sup>3</sup> HM Treasury (2020) [Response to the National Infrastructure Assessment](#)

<sup>4</sup> Department for Transport (2021) [Decarbonising Transport: A Better, Greener Britain](#)

<sup>5</sup> National Infrastructure Commission (2019) [Lessons Learnt: Reviewing the Process of the First National Infrastructure Assessment](#)

<sup>6</sup> ICE (2021) [Policy Position Statement: Evolving the UK Strategic Infrastructure Planning System](#)

<sup>7</sup> Ibid

## Future demand

**Question 1:** Which assumptions around future demand, which sat behind the first NIA, are still valid? And which need fundamental review?

The first NIA was underpinned by evidence and several assumptions around future infrastructure supply and demand scenarios, including changes in the economy, population and demographics, climate and environment, and technology.

The first NIA recognised the significant uncertainty around these areas and that, in most cases, a range of plausible outcomes should be examined.

At an economic level, the first NIA assumed that the long-term average growth of UK GDP would be anywhere between 0.7% and 1.9% per year up to 2050.<sup>8</sup>

The core demographic assumptions included that the UK population could grow to between 73.7 million and 80.1 million by 2050 (representing anywhere between a 14.1 and 24% increase on the UK's 2014 population), driven largely by an ageing population; that more people would live in urban areas, with London's population in particular expected to rise strongly; and that the average household size would fall by 6%.<sup>9</sup>

The first NIA was based on the UK's previous legal requirement to reduce greenhouse gas emissions by at least 80% by 2050, based on 1990 levels.<sup>10</sup> In light of the UK's 2050 net-zero greenhouse gas emissions target, announced in 2019, the NIC updated the NIA's recommendations to reflect the fundamental changes that the infrastructure system would need to go through on the transition to net zero, finding that many recommendations were more urgent than previously thought.<sup>11</sup>

The greatest level of uncertainty was in technological change, with the NIC finding that there was no consensus about the likely pace and impact of innovation over the coming decades.<sup>12</sup> Estimates to 2050 are inevitably uncertain, though a number of assumptions were made on ever-greater reliance on digital communications and the growth of connected and autonomous vehicles.<sup>13</sup>

In 2016, ICE's National Needs Assessment set out the demands that the UK's infrastructure system would face up to 2050, based on modelling from the Infrastructure Transition Research Consortium.<sup>14</sup>

This included a growing population (predicted to reach 75 million by 2050); demand for energy increasing from 900TWh/year to 1,200 TWh/year; increased congestion on strategic roads and capacity challenges on both the rail network and airports; and an increased number of properties at high risk of flooding.<sup>15</sup>

<sup>8</sup> National Infrastructure Commission (2017) [Economic Growth and Demand for Infrastructure Services](#)

<sup>9</sup> National Infrastructure Commission (2016) [The Impact of Population Change and Demography on Future Infrastructure Demand](#)

<sup>10</sup> National Infrastructure Commission (2017) [The Impact of the Environment and Climate Change on Future Infrastructure Supply and Demand](#)

<sup>11</sup> National Infrastructure Commission (2020) [Net Zero: Commission Recommendations and the Net Zero Target](#)

<sup>12</sup> National Infrastructure Commission (2016) [The Impact of Technological Change on Future Infrastructure Supply and Demand](#)

<sup>13</sup> National Infrastructure Commission (2018) [National Infrastructure Assessment](#)

<sup>14</sup> ICE (2016) [National Needs Assessment](#)

<sup>15</sup> Ibid

The change in work, travel, spatial and social patterns seen as a result of Covid-19 may well leave longer-lasting impacts, and it has been confirmed that the second NIA will consider potential scenarios for long-term behaviour change as a result of the Covid-19 pandemic, further building on the NIC's recent analysis on this topic.<sup>16</sup>

Infrastructure itself is inherently spatial, and the government's levelling-up agenda may well affect the geographical profile of demand for infrastructure. Understanding where people will live and what numbers is a key input into developing scenarios for possible future infrastructure demand.

## Priorities for the second NIA

**Question 2:** Within each of the three currently identified themes for the second NIA (net zero, levelling-up, climate resilience), what should be the core considerations for infrastructure by sector and region?

**Question 3:** Are there other issues outside these three themes that should be explored in the second NIA to deliver against the NIC's objectives?

The NIC's objectives are to:

- support sustainable economic growth across all regions of the UK
- improve competitiveness
- improve quality of life.

The aim of the NIA is to deliver against these objectives, setting out recommendations to the government.

It is expected that the second NIA will be published in the second half of 2023.<sup>17</sup> The NIC has confirmed that the process for the second NIA will begin with the publication of a baseline analysis of the current state of each of the key infrastructure sectors, due in autumn 2021. This data-led analysis will sit alongside the NIC's proposals for the strategic themes and main priorities it intends to explore in NIA2, which will form a consultation.

The process is supported by three expert advisory panels – on **net zero**, **levelling-up** and **climate resilience**.

### Net zero

Achieving the net-zero target by 2050 will require an unprecedented transformation of infrastructure systems and the built environment.

For example, despite the progress made in reducing emissions from energy generation in the last decade, the Climate Change Committee (CCC) forecasts that low-carbon electricity generation will still need to quadruple to replace existing fossil-fuel generation and meet the expected increased demand from transport and heating.<sup>18</sup>

<sup>16</sup> National Infrastructure Commission (2021) [Behaviour Change and Infrastructure Beyond Covid-19](#)

<sup>17</sup> National Infrastructure Commission (2021) [Timeline for Second National Infrastructure Assessment Announced](#)

<sup>18</sup> Climate Change Committee (2019) [Net Zero – The UK's Contribution to Stopping Global Warming](#)

Transport accounts for the largest proportion of the UK's emissions. The transition to zero-carbon vehicles and modal shift to active travel and public transport is critical if the country is to deliver on its legally binding 2050 net-zero target. The CCC has identified the need to invest in walking and cycling infrastructure to support this and to improve digital infrastructure to reduce the need to travel for work where possible – behaviours that the Covid-19 pandemic has sped up. The CCC also forecasts that 46 million electric vehicles will need to be on UK roads by 2050. This in itself will require significant levels of new charging infrastructure.<sup>19</sup>

Other core considerations include:

- decarbonising heat, including the retrofit of buildings for electrification, energy efficiency, insulation and potentially hydrogen
- reducing emissions from harder-to-abate sectors, including the deployment of carbon capture and storage and negative emissions technologies
- reducing emissions from the waste sector, including optimising the 'reduce, reuse, recycle' framework and creating a more circular economy.

### **Levelling-up**

The government's levelling-up goal has the potential to be vitally important in the context of meeting long-term objectives and demand for infrastructure services.

Local decision-makers will have a major role in achieving these goals, particularly supporting behavioural change – for example, encouraging modal shift in transport and the planning system's role in ensuring infrastructure demand can be met and environmental impacts mitigated. There are strong links between levelling-up and both net zero and climate resilience. Local leaders are best placed to develop climate action plans that suit the specific circumstances, opportunities and needs of their area, such as the nature of housing stock for retrofit, local energy/heat generation and distribution schemes, flood defence projects and travel patterns.

But there are questions about whether these local decision-makers have the necessary powers, funding and governance arrangements. A strategic approach to establishing how different infrastructure networks work across regions, including housing, is likely to be key to enabling the government's levelling-up agenda to come to fruition. This is because taking such an approach is most likely to optimise the various economic activities that also exist and are taking place across different regions.

It is also important to consider the role of strategic economic infrastructure, such as national road and rail networks, in supporting levelling-up through improved connectivity.

### **Climate resilience**

The greatest direct climate change-related threats for the UK are large increases in flood risk, exposure to high temperatures and heatwaves, and water shortages.<sup>20</sup> Changes in temperature and rainfall patterns and intensity will place additional pressures on infrastructure, particularly the rail, road, water and energy sectors.

Climate change will also affect the availability of water resources and the potential for extreme loads on infrastructure systems. Flood management and urban drainage systems will therefore need to account for this changing risk over time.<sup>21</sup>

<sup>19</sup> Climate Change Committee (2019) [Net Zero – The UK's Contribution to Stopping Global Warming](#)

<sup>20</sup> ICE (2016) [National Needs Assessment](#)

<sup>21</sup> Ibid

The CCC has warned that climate resilience remains 'a second-order issue', under-resourced despite the UK having the capacity to respond effectively.<sup>22</sup> ICE has previously identified that the lack of a systems-thinking approach within the built environment sector to resilience as a whole is an issue that must be addressed, with the potential for cascade failure across interdependent infrastructure systems.<sup>23</sup>

## UN Sustainable Development Goals

**Question 4:** How can the second NIA move the UK closer to achieving the Sustainable Development Goals through infrastructure interventions?

The UK has long-term social, economic and environmental goals, notably the 2030 UN Sustainable Development Goals (SDGs). The SDGs all link to tackling recognised long-term challenges in the UK, including climate change, regional economic inequalities, poor productivity and a workforce lacking the right skills.<sup>24</sup>

Infrastructure has a crucial role to play in achieving the SDGs: not only is there an infrastructure-specific SDG, but research has shown that 72% of the SDG indicators are linked to networked infrastructure investment and 92% when all forms of infrastructure are considered.<sup>25</sup> This includes job creation, the ability for infrastructure to generate economic activity, protecting the environment, and the manifold benefits to society that infrastructure can bring through safe, reliable, affordable and accessible systems. But despite this important role, few developed countries use the SDGs or reference them as part of their infrastructure plans.<sup>26</sup>

ICE's recent review of the UK strategic infrastructure planning system recommended that the objectives for the NIC, set out in the framework document, should be updated to include net zero and the SDGs.<sup>27</sup>

With the NIC already signed up to the Vision for the Built Environment,<sup>28</sup> which places the achievement of the SDGs as the primary outcome for infrastructure development, infrastructure to support achieving the SDGs would codify existing good practice.

## About ICE

Established in 1818 and with over 95,000 members worldwide, the Institution of Civil Engineers exists to deliver insights on infrastructure for societal benefit, using the professional engineering knowledge of our global membership.

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<sup>22</sup> Climate Change Committee (2021) [Independent Assessment of UK Climate Risk](#)

<sup>23</sup> ICE (2020) [ICE Response to the National Infrastructure Commission Resilience Study Scoping Report](#)

<sup>24</sup> ICE (2020) [Covid-19 and the UK's Sustainability Challenges – Lessons for the New Normal](#)

<sup>25</sup> ICE (2020) [ICE Strategy Sessions: How Can Infrastructure Help Achieve the UN Sustainable Development Goals?](#)

<sup>26</sup> Principles for Responsible Investment (2020) [Are National Infrastructure Plans SDG-Aligned, and How Can Investors Play Their Part?](#)

<sup>27</sup> ICE (2021) [Policy Position Statement: Evolving the UK Strategic Infrastructure Planning System](#)

<sup>28</sup> Centre for Digital Built Britain (2021) [Vision for the Built Environment](#)