

National Infrastructure Commission

The Second National Infrastructure Assessment: Baseline Report - Call for Evidence response

The Tees Valley Combined Authority is a Mayoral Combined Authority driving economic growth and job creation across Tees Valley.

We are a partnership of Darlington, Hartlepool, Middlesbrough, Redcar & Cleveland and Stockton-on-Tees local authorities, working with the Local Enterprise Partnership, wider business community and other partners to make local decisions that support the growth of our economy. Under our devolution deal, we have taken on responsibilities previously held by Whitehall including transport, infrastructure, skills and business investment.

We welcome the opportunity to participate in this call for evidence.

Question 1: Do the nine challenges identified by the Commission cover the most pressing issues that economic infrastructure will face over the next 30 years? If not, what other challenges should the Commission consider?

The Tees Valley Combined Authority is in firm agreement with the challenges identified by the Commission, especially those relating to the compelling need for the rapid decarbonisation of the UK's power and industrial systems – and the Commission's recognition that this would be best achieved through the accelerated development of the infrastructure necessary to deploy hydrogen-based energy solutions in partnership with carbon capture and storage.

Our locally agreed Local Industrial Strategy sets out to make the Tees Valley a global leader in clean energy and the UK's first net zero industrial cluster – and hydrogen is central to those ambitions. We are the UK's largest producer of accessible hydrogen and have a unique combination of established hydrogen infrastructure, experience in operating hydrogen systems at scale and proven innovation specialisms – making us an ideal hub for deploying hydrogen at scale to decarbonise homes, industry and transport. We have also been named the national Hydrogen Transport Hub, bringing together industry and researchers to develop hydrogen technology and infrastructure to power buses, HGVs, trains, boats and aeroplanes, making the Tees Valley a global pioneer in industrial research on hydrogen as a fuel and a development and deployment hub for hydrogen transport.

It is estimated that in realising these and other ambitions, the hydrogen sector could add up to £7bn to regional economy between by 2050 as well as supporting greater renewable energy deployment and the wider levelling up of places like Teesside. The impact of this would be felt way beyond the region itself both economically and environmentally.

Airports and air travel is a key contributor to a region's economic infrastructure, economic growth and success. An additional challenge to note over the next 5 years is the R&D and then scaled-up production of Sustainable Aviation Fuel (SAF). The Tees Valley has the chemical feedstocks (and some such as CO₂ are waste greenhouse gases) that technology is starting to work with to develop SAF. SAF will be key to the sector significantly reducing its carbon footprint.

One further thematic area we feel is currently underdeveloped in national policy making is the role of carbon removal technologies. As the Committee on Climate Change has noted, by 2050 the majority of CO₂ stored in the UK will be carbon removals, forecast to be equivalent to 60Mt by this point. Given the pivotal role carbon removal technologies will play to the achievement of net zero, we feel there could be merit in considering such technologies, in conjunction with carbon capture, utilisation and storage technologies.

Question 2: What changes to funding policy help address the Commission's nine challenges and what evidence is there to support this? Your response can cover any number of the Commission's challenges.

We welcome the recognition in the recently-published Levelling Up White Paper that place-making is key to national prosperity, and that local leaders must be empowered to deliver that place-making.

The government's Levelling up Agenda is best pursued through an approach to regional development in which long-term funding is devolved regionally to bodies able to demonstrate appropriate levels of accountability and governance, including Mayoral Combined Authorities, in order to deliver national priorities - a place-based approach to investment built on regional strengths and major clusters of excellence in key economic sectors and technologies and the necessary investment in infrastructure, skills and innovation to maximise their economic impact. Such an approach would allow regions like Tees Valley to fast-track major local opportunities to deliver economically and environmentally significant projects and deliver on national ambitions.

Future devolution requires more strategic and focused use of existing funding streams to maximise the potential of existing powers. For example:

- Flexible capital investments, as already implemented with the Transforming Cities Fund, Towns Fund and Connected Cities Fund, where greater autonomy is granted to regions to collaborate with government to identify and fast-track the delivery of infrastructural investment and regeneration priorities.
- Use of multi-department place-based budgets, allowing local interventions to be built around the needs of the regions and their ability to contribute to national aims.
- Devolution of BEIS innovation funds, such as the Industrial Energy Transformation Fund to Combined Authority areas.
- As outlined in the Levelling Up White Paper, maximum devolution of the planned Shared Prosperity Fund to drive regional development and deliver the government's levelling up agenda.

With particular regard to the delivery of a decarbonised industrial and energy system – and as demonstrated in the success of established funding mechanisms such as Contracts for Difference and the Levy Control Framework - providing a long-term funding framework to support the business models for an emerging sector is vital in developing a strong pipeline of projects to materialise and supporting private sector investment.

We would advise that government front-loads funding support for CCUS projects and Track-2 clusters in order to accelerate the deployment of CCUS, increase investor confidence, deliver cost reductions for future support phases, reduce national and global CO2 emissions and establish the UK as a global leader on CCUS – in doing so revitalising and regenerating the UK's industrial heartlands.

The Tees Valley is at the forefront of the clean energy revolution, working to de-carbonise its industrial bases and create cleaner, safer and healthier sectors. Two firms based in the region have successfully secured funding through the Government's Green Fuels, Green Skies competition to develop sustainable aviation fuels (SAF) production plants in the UK. Increased funding to support this technology, its growth and the greening up of the aviation sector would be welcomed.

Question 4: What interactions exist between addressing the Commission's nine challenges for the next Assessment and the government's target to halt biodiversity loss by 2030 and implement biodiversity net gain? Your response can cover any number of the Commission's challenges.

- **Challenge 1. All sectors will need to take the opportunities of new digital technologies.**

Digital technologies especially relating, for example, to satellite imagery, geographical information systems and remote monitoring e.g., continuous monitoring devices in rivers to measure pollution, GPS tracking of wild birds or Eddy Flux equipment to measure CO2 emissions can help to meet targets to reduce biodiversity loss.

Digital technology can help to assess where ecological interventions are best targeted and can be used to monitor and evaluate how effective these actions have been to meet the government targets required to halt biodiversity loss.

- **Challenge 2. The electricity system must decarbonise fast to meet the sixth Carbon Budget.**

Decarbonising the electricity system fast will have a positive effect on wildlife by reducing the negative impacts of climate change before this can cause greatest damage.

It is likely that Major Infrastructure Projects will not be exempt from the Biodiversity Net Gain requirements, although the threshold may be different to Town and Country Planning Act cases. Any negative impacts from major or minor infrastructure projects may still be mandated to increase biodiversity gain whether that be on or off-site.

It is proposed that the marine environment will initially be exempt from Biodiversity Net Gain. Development of offshore windfarms in the Netherlands has shown that biodiversity net gain improvements can be carried out on the sea bed relatively easily and at low cost and present a good opportunity to halt marine biodiversity loss. Being relatively low cost, these interventions have very little inconvenience to developers and offer public relations benefits.

A positive impact could arise from for example the planting of new mixed woodland forestry areas as this will result in enhanced biodiversity. In addition, improved management of existing woodlands including the carrying out of necessary thinning in currently neglected woodlands could result in a halt to the biodiversity loss of certain woodland species.

- **Challenge 3. Decarbonising heat will require major changes to the way people heat their home.**

Decarbonising heat in homes will require hydrogen and electricity investments – the comments expressed in Challenges 2 and 4 above and below respectively are also relevant to Challenge 3. This will also be of relevance to wider points made within the submission about the development of a hydrogen economy.

- **Challenge 4. New networks will be needed for hydrogen and carbon capture and storage.**

Projects may be subject to Biodiversity Net Gain requirements. It is likely that brownfield sites, which can have high ecological value will not be exempt from Biodiversity Net Gain regulations therefore any infrastructure connected to hydrogen and carbon capture and storage may need to consider onsite or offsite Biodiversity Gains.

- **Challenge 5. Good asset management will be crucial as the effects of climate change increase.**

Good asset management can help to benefit biodiversity. In the case of Local Authorities and Combined Authorities assets include structures and estate land which may have high ecological value. Public bodies should have regard for biodiversity in all decision making as in the Natural Environment and Communities Act 2006 and this duty is strengthened in the Environment Act 2021.

As the owners of land we may be able to consider opportunities for green energy generation within our portfolio, such as solar panels in public spaces.

The effective management of natural assets can reduce the effects of climate change as well as increasing biodiversity e.g., street trees reduce urban heat island effect as well as increasing biodiversity.

- **Challenge 6. Action is needed to improve surface water management as flood risk increases.**

This is the Challenge which intersects most widely with biodiversity. Nature-based solutions have been identified as a means of reducing surface water flooding.

Sustainable drainage interventions such as green roofs, living walls, permeable natural surfaces, rain gardens, infiltration caused by trees, swales and ponds reduce surface water flooding whilst also enhancing biodiversity.

Reduction in surface water is required as many Victorian combined sewer systems in urban areas are not able to cope with increased high flow rates which may arise as a result of climate change. Improving surface management reduces the risk of flooding as well as reducing pollution risk.

Other interventions in the upper regions of catchments to reduce river flooding, such as peatland restoration, also improve biodiversity and have other benefits. In addition, interventions in coastal areas such as allowing the creation of saltmarsh and other marine habitats can reduce on shore tidal risk.

The Local Enterprise Partnership have highlighted the economic impact of widespread flooding of major riverside industrial sites in Tees Valley and consideration should be given to enable improvements which have benefits to both flood risk and biodiversity where appropriate

- **Challenge 7. The waste sector must support the move to a circular economy.**

A more circular economy may reduce the impacts on natural systems to provide raw materials and therefore result in an increase in biodiversity but full lifecycle analysis of circular economy processes may be required to ensure there are not negative impacts on biodiversity.

- **Challenge 8. Improved urban mobility and reduced congestion can boost urban productivity.**

Action to create new green infrastructure to support cycling and walking will have multifunctional benefits in that the development of these can result in increased biodiversity.

Question 6: In which of the Commission's sectors (outside of digital) can digital services and technologies enabled by fixed and wireless communications networks deliver the biggest benefits and how much would this cost?

One of the sectors in which we feel digital services and technologies can deliver the biggest benefit is **Transport** – in particular the development of intelligent transportation systems. Investment in intelligent transportation systems is an increasingly essential part of delivering world-class transport systems to underpin economic transformation. These systems use the latest technology to provide innovative services relating to different modes of transport and traffic management, enabling users to be better informed and make safer, more coordinated and smarter use of transport networks. Within the Tees Valley the Combined Authority has successfully secured funding from the City Region Sustainable Transport Settlement (CRSTS), to develop mass transit networks and sustainable transport options, open up new areas of the region for employment, leisure and housing, and create real innovation in transport to solve problems. As part of the Tees Valley CRSTS we have developed a Transport Digital Strategy which will support the development intelligent transportation services in the region.

Another sector in which digital services and technologies will deliver benefits are within the **Energy** sector. We feel that digital technologies will be an essential tool in achieving government's target of reaching Net Zero by 2050, with technology enabling a better understanding of energy usage as well as increasing efficiencies. Our research shows that local businesses will require support to understand and utilise technologies that assist in the reduction of carbon emissions and help restore biodiversity, giving businesses the digital tools to reduce their own emissions as we drive forward a Green Industrial Revolution. Examples range from usage of smart meters in homes linked to demand management systems to AI-powered climate research and carbon capture facilities.

Question 7: What barriers exist that are preventing the widescale adoption and application of new digital services and technologies to deliver better infrastructure services? And how might they be addressed? Your response can cover any number of the Commission's sectors outside digital (energy, water, flood resilience, waste, transport).

The main barrier that exists is the lack of reliable digital infrastructure delivered through fixed and wireless communication networks, however we understand that this has been covered under the first assessment and is in the process of being addressed by Government through Project Gigabit.

In the Tees Valley 99.5% of businesses are SME's, and our research has found that local businesses, in particular SME's require support to understand and undertake digital innovation. The Made Smarter programme goes some way towards providing this support for the Manufacturing sector, however there is a lack of support for other industry sectors. We have had positive feedback from businesses who have benefited from the Made Smarter programme and feel this would benefit from being expanded across industry sectors.

A further barrier is lack of local council funding to invest in smart technology to benefit residents. The utilisation of smart technology would allow local authorities to interact directly with both community and local town infrastructure to monitor how towns and local areas are evolving. Technology would be used to enhance the quality, performance and interactivity of urban services, ultimately reducing costs and use of resources. This could include intelligent transportation services, and waste management technology, however at the moment investing in technology is sometimes not a priority.

Question 8: What are the greatest risks to security of supply in a decarbonised power system that meets government ambition for 2035 and what solutions exist to mitigate these risks?.

A major risk to security of supply in a decarbonised power system is the pace of change required to deliver such a system.

The most cost-effective and time-efficient mitigation would be to focus immediate infrastructural development on areas of the UK with the most developed clean energy ecosystems and infrastructure and greatest natural advantages.

Over 90% of homes in the East region, which encompasses both the Tees Valley and Humber regions are already connected to the gas network. A UK rollout of 20% blending of hydrogen into the gas grid could reduce annual emissions by 6 million tonnes of CO₂ without requiring changes to appliances. Already established transport and storage networks, significant levels of hydrogen production, access to major offshore storage sites and ready access to power from offshore wind farms would also accelerate delivery and minimise expenditure – while offering significant opportunity for the renewal and regeneration of the UK's industrial heartlands.

Another major issue necessary for the Commission to consider is the intermittency of renewables.

Recent events have drawn attention to weaknesses in the UK's energy supply chain and gas storage capacity- we remain reliant on gas imports which are vulnerable to market or political pressure. We must establish greater resilience in our energy systems through greater domestic energy generation through offshore-derived electricity, nuclear, renewables and hydrogen, with the later benefiting from an established and readily-adaptable transport and storage network in the Tees Valley region.

In August 2019, severe disruption to the UK energy network – and as a result the transport network and other critical infrastructure - was caused by a lack of reserve capacity following the simultaneous loss of renewable and conventional generation capacity, demonstrating a compelling need for spare capacity.

There are plentiful solutions to this issue, such as the diversification of generation capacity, or greater use of interconnectors linked to other countries, or the provision of additional domestic storage. But such solutions would be highly likely to be costly for both consumers and taxpayers – and in the case of interconnectors could have the effect of putting more pressure on the system – and require strong demand management processes. Hydrogen, both produced from fossil sources (so called-green hydrogen) and renewables (blue hydrogen) can provide a demand management solution and a fuel store for power generation on demand.

Furthermore, as recent disruption to the vital infrastructure on the island of Tonga following a Tsunami has underlined, infrastructure like offshore cables and pipes must be resilient enough to withstand challenges posed by nature, or even malign actors.

Question 9: What evidence do you have on the barriers to converting the existing gas grid to hydrogen, installing heat pumps in different types of properties, or rolling out low carbon heat networks? What are the potential solutions to these barriers?

In terms of the gas grid, it is our contention that there are few barriers to the conversion of the existing gas grid to hydrogen.

In fact, research indicates that 20% hydrogen could be blended into the existing gas network with no domestic adaption required, and some trials – such as the Hy4Heat programme at

Spadedam – have suggested that with minor adaptations to the gas piping to homes 100% hydrogen can be as safe as the current gas system, and major appliance manufacturers are already committed to delivering hydrogen-ready boilers at no greater cost than natural gas equivalents.

The biggest single obstacle to this conversion is the pace of change required – but this obstacle can be overcome with strategic use of existing infrastructure and natural resources. The growth of hydrogen as a fuel is dependent upon the connection of supply of low carbon hydrogen from multiple production methods to demand in industry, energy, transport and domestic end users. The fastest way of facilitating this is through the repurposing of existing pipelines and prioritising investment in sites which are close to geological storage sites and offshore wind.

On heat networks we would suggest up to now the principle barrier to adoption has been the low returns offered by such systems using conventional fuels when considering retrofit. There is also the outsourcing of energy supply on long term contracts which hinders the public sector developing solutions across its estate. New build is often able to meet planning requirements without heat networks, which suggests this might be an avenue to consider. One aspect which the Scandinavians have taken forward is to make sure heat networks are understood by customers, well maintained and can be easily controlled.

Question 11: What barriers exist to the long term growth of the hydrogen sector beyond 2030 and how can they be overcome? Are any parts of the value chain (production, storage, transportation) more challenging than others and if so why?

The Combined Authority perceives the following barriers to the long-term growth of the hydrogen sector at the present time.

- The confirmation of business model for fossil hydrogen with CCS which provide sufficient guarantee of return to attract investors
- A long-term national commitment to development of the hydrogen sector and associated CCS infrastructure
- The provision of hydrogen distribution networks. Production is not an issue but distribution (and to a lesser extent storage) is a major technological hurdle, as unlike for electricity there is little national infrastructure either for heat or transport.
- Demand is key to the development of the sector whilst carbon is priced into the economy. There is a need for long term commitment and the regulation of emissions and funding to develop.
- Available skills and labour, and UK supply chain resilience.

Question 12: What are the main barriers to delivering the carbon capture and storage networks required to support the transition to a net zero economy? What are the solutions to overcoming these barriers?

The government has made its ambitions for Carbon Capture, Utilisation and Storage and Hydrogen clear. It now needs to develop the necessary framework to deliver those ambitions – specifically a 10-20 year funding and policy framework which can deliver CCUS cluster projects at pace throughout the 2020s.

Such a framework will provide the clarity required for private sector investors and the supply chain on the future pipeline of projects and lead-in times that are required and improve the visibility and appeal of inward investment opportunities.

Major investment is currently being made in CCUS in Tees Valley, in particular through the Net Zero Tees Partnership of six leading energy firms, which aims to capture and store up to

10 Mtpa of CO₂ by 2030. Firms such as bp and Kellas Midstream are planning to make significant investment in hydrogen production facilities on Teesside. But a strong pipeline of projects will be necessary to continue this momentum into the 2020s and beyond.

A number of other significant businesses are also exploring opportunities for investment in carbon capture and storage networks in the Tees Valley region and beyond, but industry is clear that decisions on investment require greater government clarity in key areas.

- Long-term funding supporting business models

The CCUS industry needs to be supported by a long-term funding framework, detailing future allocation rounds, through the business models. The Government have committed to outlining a funding envelope for industrial carbon capture and hydrogen in 2022, it is critical that this funding level is proportionate to allow projects to come forward to access funding out to 2030.

Without this framework the necessary pipeline of projects may not materialise as companies will not be able to justify investment with an uncertainty around the business model funding envelope throughout the contract.

- A clear funding framework mapped against the deployment timelines for projects

Early CCUS projects need to be supported by a funding framework which can allow for rapid progress towards deployment and market. As CCUS can potentially cover so many applications and sectors, funding has the potential to become segmented and disjointed. If this funding timeline presents funding gaps.

It is also extremely important to consider the public acceptance of the infrastructure and the impact on taxation and energy costs. It is essential that consultations and programmes of involvement of the public regionally as well as nationally are initiated early enough to ensure that schemes are supported by the majority of the population.