

ICE response to the Great British Railways Whole Industry Strategic Plan call for evidence

February 2022

Introduction

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

This response focuses on questions 1, 3, 5 and 6 of the call for evidence. It has been informed by experts on ICE's Transport & Mobility Community Advisory Board and regional committees.

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Summary

Public transport systems are a significant enabler of economic, environmental and social prosperity. Their continual development requires strong stewardship, ensuring the correct interventions are made at the right time for the public benefit.

The rail network is a complex, highly interdependent system. The proposal for Great British Railways (GBR) to bring together rail operators and infrastructure within one organisation has the potential to enable better collaboration and management of these interdependencies, while aligning both the costs and benefits of key programmes could help accelerate vital work such as electrification.

The Whole Industry Strategic Plan (WISP) represents an opportunity to set out the type of transport options that are necessary and desirable for the UK to meet long-term national goals, and to identify and implement measures to make it easy for the public to take up those options.

As we make clear in our response, there is no viable path to net-zero without decarbonising transport and enabling modal shift from private cars and air travel to active travel and public transport, while better rail connectivity will also be vital for unlocking the economic potential of underperforming regions and rebalancing the UK's economy.

That said, we note that there has been no public consultation on the powers, duties, authorities and accountabilities that will be granted by statute to GBR, nor details of what those attributes will be or the timeframe for when that will be decided and completed. The uncertainty about those details means the deliverability of the proposals put forward for the WISP is therefore uncertain.

ICE is ready to support the GBR Transition Team in the development and definition of those statutory powers, duties, authorities and accountabilities that GBR will need to enable delivery of the ambitions and proposals to be set out in the WISP.

1. Strategic Objectives for the Whole Rail Industry

How is it possible to make progress against a number of these objectives simultaneously? Do any of the objectives have larger barriers associated with them than others, or do any objectives pose possible barriers to others? Where would you make the trade-offs?

Making progress against the strategic objectives set out in the WISP will require in part the planning and delivery of major infrastructure projects which span a development time of years or decades.

These complex projects will require significant investment, but given the disparity between available funds and the number of potential projects, the prioritising and sequencing of investment will be key for ensuring that vital work is not delayed, resulting in greater problems and costs being incurred in the future.

Given that major infrastructure projects often cost more or take longer than initial estimates outline, in 2019 ICE published a paper setting out recommendations to help stakeholders limit overruns, while also arguing for a shift in thinking around which outcomes are most desirable and what constitutes success.¹

Polling conducted for ICE at the time showed that the public would support attaching more weight to the whole-life benefits of projects and programmes – be they economic, social or environmental – rather than focusing on achieving lowest capital cost in delivery.

The full recommendations are outlined below:

- Infrastructure owners should complete scope, design and exploration before commencement of work is allowed, to avoid scope creep or retroactive changes, taking steps to include contractors in design at an early stage.
- The Government and infrastructure owners must move away from capital cost as the most important metric when assessing project benefits, recognising the importance of whole-life economic, social and environmental value.
- Principles set out in the Outsourcing Playbook should be mandatory for Government infrastructure owners, this includes infrastructure owners undertaking should-cost modelling to help inform their expectations and knowledge of appropriate tender prices during the procurement process.
- It should be mandatory for all public infrastructure owners undertaking procurement to award contracts based on a cost estimate range, using a should-cost estimate as a reference point, with an amount of contingency allocated appropriate to the level of project maturity.

The publication of the Construction Playbook in December 2020 reflects a number of these recommendations and should help by converting existing small pockets of good practice into an industry-wide change programme.

Enterprise based delivery models

Many in the sector are also turning to enterprise-based delivery models to reduce the gap between estimates and outturn. The Infrastructure Client Group's Project 13, which ICE has supported, is an industry-wide change programme to shift the industry from a transactional business model to an enterprise model.

An enterprise-based delivery model means reward/profit in the enterprise is based on value added to the overall outcomes, not time spent. The relationships between organisations last over a longer period, incentivising investment in skills and tailoring of supply-chain business models and there is greater understanding of cost drivers and risk across all organisations in the enterprise, with commercial incentives for collaboration to jointly mitigate risk, not transfer it.

¹ ICE (2019) [Reducing the Gap Between Cost Estimates and Outturns for Major Infrastructure Projects and Programmes](#)

Systems thinking

It is also important that major transport projects are not considered in isolation. The majority of new or expanded infrastructure assets will need to be integrated into existing networks and services. Systems thinking can improve delivery of complex infrastructure projects through a Systems Approach to Infrastructure Delivery (SAID).

This approach has already been extremely effective in other project-based industries such as oil and gas, and aerospace.² The infrastructure industry will also need look at how the technology and software industries have applied an intense continuous development mindset to help systems adapt to rapidly changing user needs, and the opportunities created by technological change.

What long-term trends in wider society, the economy, and the environment will affect these five objectives over the next 5, 10, and 30 years?

ICE's work on Covid-19 and the new normal identified that long-term infrastructure planning should still be driven by existing long-term challenges, including population growth, rebalancing the economy, meeting the carbon emission reduction targets and achieving the UN Sustainable Development Goals (SDGs).³

In terms of public transport, these networks must provide more journeys and carry more passengers in the years ahead if we are to meet these objectives. Those choosing not to or unable to cycle or walk are more likely to revert to the private car if public transport cannot deliver an acceptable, affordable alternative.

What are the key uncertainties you consider that the Strategic Plan must be resilient to in order to be effective over the next 5, 10 and 30 years?

The impact of climate damage on rail infrastructure and service levels is already significant and likely to worsen over time.⁴ There is a need to invest now to strengthen the resilience of the rail network, especially given the age of much of its infrastructure, to ensure the safety of passengers and the ability to maintain service levels in the future.

In addition, it remains unclear how the Covid-19 pandemic will affect demand and travel patterns. Even before Covid-19, the regular five-day commute was in slow decline due to increases in flexible working, which has been further enabled by the accelerated widespread adoption of digital collaboration tools.⁵ Flexible working trends likely to have occurred over the next decade instead happened in a single year.⁶

There could therefore be a lasting change in the type, destination and timing of trips people take. There may be fewer commutes into cities and changes to where people live, resulting in increased population levels in smaller towns and rural areas, which are not as well served by public transport as larger towns and cities.

Such dramatic change would present a major challenge for public transport networks, which have built large parts of their infrastructure, services and revenue models around carrying commuters during peak hours.

Public transport operators would need to adjust service scheduling, pricing and ticketing options, and appeal to wider markets. While commuters may not return at pre-pandemic levels, there could be opportunities for rail to grow as a transport option for leisure purposes. Such customers may demand a more comfortable journey, while the practice of closing lines for engineering works primarily on weekends and bank holidays may also need to be rethought.

² ICE (2020) [Doing a Better Job: A Systems Approach to Infrastructure Delivery](#)

³ ICE (2020) [Covid-19 and the New Normal for Infrastructure Systems – Next Steps](#)

⁴ Network Rail (2021) [Third Adaptation Report](#)

⁵ Felstead, A and Reuschke, D, Wales Institute of Social and Economic Research (2020) [Homeworking in the UK: Before and During the 2020 Lockdown](#)

⁶ ICE (2021) [ICE Discussion Paper: Public Transport Funding Post-Covid](#)

In the National Infrastructure Commission's (NIC) longer-term scenario analysis work on infrastructure and behavioural change, four out of five scenarios would see a reduction in annual trips on public transport by 2055.⁷ The analysis illustrates that even limited changes in public behaviour can affect overall demand or distributional patterns.

That said, the NIC has also cautioned that it is too early to assume that behavioural change will lead to completely different patterns of infrastructure use long term.⁸ The UK's population will continue to grow and there is political impetus to invest in public transport infrastructure to meet national objectives such as net-zero.

Given these demand uncertainties, intelligent use of scenario planning will be vital, with operators taking a more adaptive approach and making the best use of data gathering and analysis on which to base their decisions.

Over the next 5, 10 and 30 years, which steps should the sector take to improve integration of rail with the wider transport system (including walking and cycling) in pursuit of these objectives?

Modal shift to public transport and active travel will play a critical role in meeting several UK government priorities, notably decarbonisation, reducing road congestion and improving air quality and health.

With the WISP, there is an opportunity to take a more holistic view of the integration of rail with other transport modes, those wider societal benefits being sought and of the type of improvements likely to incentivise people to take up rail instead of other modes. The goal should be to make it easier and more desirable for passengers to complete journeys through a combination of active travel and public transport options.

Historically planners have focused on journey time improvements and neglected other factors that could improve the passenger experience, such as the condition of and facilities on station platforms, how people get to stations and how convenient it is to make connections to other modes of transport.

Again, intelligent use of scenario planning as well as constant data monitoring and new baseline assumptions about how people will use and move through transport systems will be essential. The government and rail industry will need to encourage people to change their behaviour through impactful incentive schemes, making best use of data to provide commuters with information on their travel options across various modes and routes and providing enabling infrastructure such as sufficient secure bike storage across all stations.

The Netherlands has been particularly successful at integrating rail and cycling infrastructure. For example, a 20-year cycle investment plan between ProRail and local/national governments to maximise convenient and high-quality cycling infrastructure at stations has doubled the proportion of rail users arriving or departing by bike (now 40% and 15% respectively).⁹ The world's largest bicycle garage is located at Utrecht railway station, with almost 13,000 parking spaces.

3. Delivering financial sustainability

Where are the most significant opportunities and barriers to delivering financial sustainability in the rail sector over 5, 10, and 30 years and how do we achieve/overcome them? How can we most effectively monitor and assess this? What is a stretching yet realistic ambition for this objective and what measures can we most effectively use to consider success over the coming 5, 10 and 30 years? What are the interventions over that period which will be the maximum value for money?

Affordable and accessible public transport is vital to addressing the UK's long-term challenges. However, there is a risk that any long-term reduction in passengers post-Covid-19 would lead to a spiral of decline whereby lower revenues force operators to cut services or increase fares and public transport becomes both less attractive and less affordable.

⁷ National Infrastructure Commission (2021) [Behaviour Change and Infrastructure Beyond Covid-19](#)

⁸ Ibid

⁹ Piersma, F. and Ritzema, W. (2021) [Fietsparkeren Bij Stations](#)

Such a deterioration in the quality of transport networks would undo years of progress and must be avoided if there is any likelihood of achieving net-zero emissions by 2050, and the UN SDGs by 2030.

In 2021 ICE published a paper identifying certain principles that an effective transport funding mechanism should be built on:¹⁰

1. The funding model requires a reasonable amount of stability and resilience. Indeed, this is one reason why the pandemic has impacted hard on UK public transport in particular, as the heavy reliance on farebox revenue left operators vulnerable.
2. The funding model must be flexible enough to scale with demand for public transport in times when there is significant growth in demand. This includes close alignment between timetables and accessibility of different modes in order to 'right-size' the system.
3. The funding model requires a diverse array of revenue sources. While the exact mix of funding will depend on local requirements, there is a need for a mix of general taxpayer revenues, farebox and some specific tax revenues. This can include road user or congestion charging, workplace or retail parking levies or looking to adopt funding models that incorporate property portfolios.
4. The funding model must be accepted by the public. There is a need for public transport to be safe, affordable, accessible and reliable, without government support for it vastly increasing the size of public sector net debt. It is important that the public do clearly recognise the value of public transport and its importance to meeting national goals, but the extent to which they are willing to pay for it needs to be a key consideration.

The paper examined how these principles would interact with various policy options available for funding public transport:

Maintaining government support

With some continued government support likely to be required following the impact of Covid-19, the key question is what structure and shape it should take. The most straightforward long-term solution is a stable agreement between the government and public transport operators to fund the gap, recognising the contribution that public transport makes to achieving wider societal goals.

However, such an approach could face public and political opposition. In the post-pandemic recovery, there is also likely to be greater competition for funding and investment across other government departments and parts of the economy. There are also risks that short-term funding agreements lead to the suspension or cancellation of planned longer-term projects.

If government funding is to continue, it should support the rail sector's ability to pursue a transition to a sustainable future. There are holistic solutions that can be used. For example, capital funding could come with conditions that stipulate authorities produce plans to reshape their networks with greater levels of active travel.

Raising fares

In the UK, the trend since the 1990s has been for the largest financial burden to fall on service users. This means rail fares have remained relatively high and utilise peak-load pricing. There are two potential outcomes from changes in demand:

- a reduction in overall demand while peak demand stays the same; or
- a reduction in peak demand while there is still demand for regular services.

Either scenario would require public transport networks to operate similar service levels to pre-pandemic, but for fewer passengers meaning lower income from fares. If passenger numbers remain low or recover slowly, a model that relies on passenger revenues for large parts of funding is unsustainable.

¹⁰ ICE (2021) [ICE Discussion Paper: Public Transport Funding Post-Covid](#)

With fewer passengers but similar levels of capacity under the existing system, fares would have to rise or concessionary travel schemes would need reconsideration. While this would lead to more fare revenue, it does not improve the long-term sustainability or resilience of the model.

In addition, raising fares risks making public transport both less accessible and less attractive for the public, which compromises the achievement of wider economic, environmental and social prosperity.

Cutting back services

Another option is for operators to cut services to reduce costs. Initial service cuts may weaken revenue and reduce overall public support if passengers permanently shift to alternative modes of transport. In the long term, underinvestment in the quality and capacity of services is likely to make public transport less attractive, leading to a slower recovery in passenger numbers and increasing the risk of not meeting national strategic goals.

Land value capture

Land value capture provides a potential mechanism for public transport authorities to generate revenue. It seeks to monetise the gains landowners can realise from land in proximity to newly developed public transport and to use it to pay for the network.

In Hong Kong, the 'Rail Plus Property' model used by the Mass Transit Railway (MTR) Corporation allows the public transport company to be self-financing.¹¹ The model effectively captures the increase in the land's value resulting from a new metro station via the deals it extracts from developers of new housing, offices and retail space around the line. Developments are also carefully managed to ensure the mix of services that customers want. The result is developments that feed the railway in exchange for a railway that maximises the value of developments.

There are, however, concerns that land value capture in this way would only be suitable for densely populated urban areas – it is one potential solution as part of a wider toolkit of available policy options.

Low-fare/fare-free public transport

While unlikely to be politically acceptable in the UK, it is worth noting that some cities have adopted a model centred around low-fare or fare-free public transport.

It is of little surprise that introducing low-cost public transport increases passenger numbers. The most successful schemes are those whose goal is to grow passenger numbers, primarily in areas where public transport use has been historically low.

Most notably, with low or free fares, increased demand is not associated with a similar increase in revenues. The costs of running the network will further rise as demand increases. If operators are to encourage passengers back onto their networks post-pandemic, fare-free or concessionary rates could be considered as an incentive, but would most likely need to be used in conjunction with revenue-raising measures to sustainably cover the costs of operations.

Green Book reforms

It is also worth bearing in mind the impact that the November 2020 changes to the Green Book could have on making the case for future investments in the rail network.

Business cases for transport have typically been based on maximising capacity and decreasing journey times. The Green Book reforms mean the strategic case must now better align to local objectives and there could be changes in how public transport projects are appraised and prioritised.

¹¹ McKinsey (2016) [The 'Rail Plus Property' Model: Hong Kong's Successful Self-Financing Formula](#)

5. Levelling up and connectivity

How could the rail industry, over the next 5, 10, and 30 years, become more responsive to, and more accountable to, local communities and passengers? Please give evidence and examples in your response.

In November 2020, the National Infrastructure Strategy confirmed that investment is being directed to improve public transport networks in regional cities. However, this is not to the extent recommended by the NIC in its National Infrastructure Assessment. The Government did not fully endorse the NIC's recommendations in areas of funding and empowering local and regional leaders to make decisions on transport, meaning policy gaps still remain.

ICE has previously recommended that capability in infrastructure planning and prioritisation should continue to be built at the subnational level by evolving subnational transport bodies to become subnational infrastructure bodies, tasked with strategically identifying and articulating long-term network requirements and creating regional infrastructure strategies.

Subnational transport bodies are focused on place-based outcomes rather than siloed infrastructure funding streams. Improving this core pillar of the infrastructure planning and prioritisation architecture would facilitate a more integrated and place-based approach to infrastructure provision at the regional and local level.

Given the urgency of the coming decade's major challenges, particularly the net-zero carbon emissions target, there will be little time to waste. Strengthening the ability for the infrastructure planning and prioritisation system to get it 'right first time' is imperative and a stronger role for sub-national actors and decision making is essential.

What is a stretching yet realistic ambition for this objective and what measures can we most effectively use to consider success over the coming 5, 10 and 30 years? What are the interventions over that period which will be the maximum value for money, and what evidence can you share to support your views?

The recent Levelling Up White Paper outlines that, by 2030, local public transport connectivity across the country will be significantly closer to the standards of London, with improved services, simpler fares and integrated ticketing. However, implementing this ambition will require real substantial change, through consultation with those on the ground, on what the long term challenges are so that the infrastructure sector can deliver solutions. Until then, infrastructure plans will struggle to articulate how they will help deliver the expected benefits to achieve the ambitions outlined in the Levelling Up White Paper.

ICE concurs with the Transport Committee's recent recommendation that the Government needs to provide more detail about how transport investment will contribute to 'levelling-up', including setting-out detailed outcomes and measures of success for 'levelling-up' against which transport projects can be assessed.¹²

In terms of connectivity, there have been decades of underinvestment in public transport in parts of the UK, contributing to lower levels of productivity in those regions.¹³ Experts interviewed by ICE have highlighted long-term issues such as the poor state of East-West connectivity and inter-city rail in the North and Midlands, which is often unreliable, with little resilience left on the network.

The recently published Integrated Rail Plan for the North and Midlands (IRP) and major projects such as High Speed 2 are intended to address this, while the Union Connectivity Review (UCR) puts forward proposals for a more connected UK-wide transport network. However, the Government has not yet responded to the UCR and there is already a possible disconnect between its vision of holistic transport corridors and the re-prioritisation of certain schemes in the IRP.

The IRP scales back many of the Northern Powerhouse Rail (NPR) proposals in favour of quick wins and upgrading current lines which falls far short of the transformational change in connectivity required. Disregarding key parts of the NPR, such as the HS2 Eastern Leg and the new line from Manchester to Leeds via Bradford, will inevitably impact connectivity and could slow down the speed at which communities in the North and Midlands can be 'levelled-up'.

¹² House of Commons Transport Committee (2021) [Major Transport Infrastructure Projects](#)

¹³ IPPR North (2021) [Broken Transport Promises Come as New Evidence Shows Widening Transport Spending Gap](#)

6. Delivering environmental sustainability

What is a stretching yet realistic ambition for this objective and what measures can we most effectively use to consider success over the coming 5, 10 and 30 years?

There is no path to delivering net zero by 2050 that does not run through decarbonising transport. In the UK, surface transport is the largest source of CO₂ emissions, contributing 23% of UK territorial emissions in 2019.¹⁴ With these emissions deriving primarily from the use of petrol and diesel in road transport, enabling modal shift of passengers and freight to rail is critical for decarbonising the sector.

Along with the overarching national policy of achieving net-zero by 2050, recent policy announcements including the Net-Zero Strategy and the Transport Decarbonisation Plan (TDP) provide further commitments and more clarity for industry and operators working to achieve environmental sustainability in their sector.

The Climate Change Committee (CCC) has called for a 90% reduction in surface transport emissions by 2050.¹⁵ The Sixth Carbon Budget sets out an evidence-based pathway for achieving this target, including measures that would reduce emissions from rail by around 55% by 2035.¹⁶ ICE supports aligning infrastructure sectors with the targets put forward by the CCC.

However, while there has been progress in reducing emissions and setting out how future cuts will be achieved, the UK is not currently on track to meet its overall target of net-zero emissions by 2050, nor the intermediate carbon budgets recommended by the CCC. The UK Government and the relevant sectors must plan to go much further, faster to achieve the emissions cuts necessary to meet these targets.

What are the interventions over that period which will be the maximum value for money, and what evidence can you share to support your views?

The measures set out by the CCC in the Sixth Carbon Budget to reduce emissions from rail by 55% in 2035 include being on track for phasing out diesel-only trains by 2040; electrifying almost half of the network, including several key freight corridors, where this is cost-effective; and deploying a mix of hydrogen, battery-electric and electric hybrid trains to replace existing diesel trains where it is not.¹⁷

The TDP set out the Government's ambition to make public transport and active travel the "natural first choice" for all who can take it. While the TDP was lighter in detail on rail than other sectors, it did include a commitment to phase out all diesel-only trains by 2040 and press ahead with electrification.

However, there remains uncertainty about the future scope of and funding for the rail electrification programme. While the IRP plans would result in over 75% of Britain's main trunk routes being decarbonised, this falls short of the level of electrification that could be achieved.

Electrification is the most cost-effective way to decarbonise the rail network and the Traction Decarbonisation Network Strategy identifies 85% of non-electrified track across the UK that Network Rail argues should be electrified.¹⁸

Electrification is essential for transferring more freight from road to rail, which brings wider benefits including better safety as well as lowering emissions across the entire transport sector.

¹⁴ Climate Change Committee (2020) [Sixth Carbon Budget](#)

¹⁵ Climate Change Committee (2021) [CCC Responds to Government's Transport Decarbonisation Plan](#)

¹⁶ Climate Change Committee (2020) [Sixth Carbon Budget](#)

¹⁷ Ibid

¹⁸ Network Rail (2020) [Traction Decarbonisation Network Strategy – Interim Programme Business Case](#)

There is also potential for innovations to reduce the cost of electrification.¹⁹ For example, a research-based approach to bridge parapets and electrical/mechanical clearances when wires pass close to bridges could in many cases substantially reduce the number of bridges or tunnels which require replacement to create space for overhead line installation.

How can rail best invest in climate resilience, supported by smarter forecasting, planning and technology, over the next 5, 10, and 30 years and what evidence do you have to support your view?

Weather related damage already has a major impact on the UK's railways in the form of delays and the cost of compensation and repairs.²⁰ As the UK's climate changes, and extreme weather events become more common, infrastructure will undergo pressures that, for the most part, it was not designed to withstand. The case for maintenance and adaptation on these grounds alone is clear, but this will require investment.

However, the CCC has highlighted a climate adaptation and resilience deficit.²¹ At present maintenance of infrastructure assets is typically underfunded.²² This is due in part to a focus on new larger capital investment programmes, but also a reduction in real terms of revenue maintenance budgets.

There are indirect risks to the rail network as well. With much of the UK's energy infrastructure located along the coast or out to sea, and at risk from sea level rises and storms, there is a risk to other networks such as rail which will be increasingly dependent on the electricity supply.

Managing these risks will require greater understanding of these interconnected micro and macro risks, cross-sectoral collaboration and joint planning across all governance levels.

A further challenge for ensuring the resilience of the rail network when key sections of track are put out of use by weather-related damage is the lack of diversionary routes available to maintain services. This can isolate affected regions and exacerbate congestion on other transport corridors, such as motorways, for extended periods of time as repairs are undertaken. More remote regions which are also vulnerable to extreme weather events, such as the South West, are likely to be particularly affected.

Making best use of existing infrastructure, such as the work underway to reopen some old lines closed following the Beeching Report, is one possible solution to strengthening the resilience of the network.

¹⁹ Rail Industry Association (2021) [Why Rail Electrification?](#)

²⁰ Network Rail (2021) [Third Adaptation Report](#)

²¹ Climate Change Committee (2021) [Independent Assessment of UK Climate Risk](#)

²² ICE and IFoA (2021) [Joint Submission to the National Resilience Strategy: Call for Evidence](#)