## Response to the National Infrastructure Commission Call for Evidence on Second National Infrastructure Assessment: Baseline Report

## February 2022

### 1.Introduction

The Chartered Institute of Logistics and Transport (CILT (UK)) is a professional institution embracing all transport modes whose members are engaged in the provision of transport services for both passengers and freight, the management of logistics and the supply chain, transport planning, government and administration. Our principal concern is that transport policies and procedures should be effective and efficient, based on objective analysis of the issues and practical experience, and that good practice should be widely disseminated and adopted. The Institute has a number of specialist forums, a nationwide structure of locally based groups and a Public Policies Committee which considers the broad canvass of transport policy.

Given our area of professional interest, we have not attempted to address all the challenges and some of those we do address are only covered insofar as they are relevant to transport and logistics. Our main focus is naturally on the transport questions in Levelling Up.

### 2.The Questions

Qu.1 We agree that these are the most pressing challenges, although we see Digital Technology as a means to an end rather than an end in itself – technology has a habit of leading to unintended consequences, such as the 80% increase in private hire vehicles in London between 2007 and 2017. The other challenges all centre around the need to achieve Net Zero whilst sustaining – and hopefully growing - the economy. Some, like Surface Water Management are 'defensive' and needed to keep the country safe whilst others – including those relating to transport – are 'proactive' and can significantly improve the economy whilst we are decarbonising.

Qu.2 Funding policies must reflect the urgency of acting to prevent irreversible climate change – the IPCC's Code Red warning regarding the need to limit global warning to 1.5C is even more urgent than Net Zero 2050. This means that low risk 'no regrets' investments in proven technologies must be authorised forthwith – we cannot afford to wait to see if novel technologies will come good: sitting on our hands for 5 years is not an option. Early progress with such low-risk investment is even more urgent where infrastructure is concerned, as consultation and construction timescales are often lengthy.

Qu.3 Good design is always desirable, but the need to act quickly may mean that some compromises may have to be made on aesthetic considerations. Insulation, energy capture and storage, and decarbonisation need to be embedded in every planning decision. The reuse and repurposing of buildings must become the priority, rather than an assumption of demolition and rebuilding, to reduce carbon emissions from construction and transport.

Qu.4 Not our area of expertise. We support the broad objective but suspect there may need to be trade-offs against other imperatives. For example, whilst railway lands provide habitat, the growing incidence of fallen trees delaying trains and bringing down overhead lines, plus the serious safety issues associated with leaf fall – vide the Salisbury rail crash in autumn 2021 – suggest that efficient operation of key transport infrastructure must take precedence over habitat.

Qu.5 We consider that there is considerable scope for improving the evaluation, authorisation and governance of infrastructure investments. Current processes are cumbersome, bureaucratic and mechanistic – 'paralysis by analysis' and excessive optioneering are rife and are often used as an excuse for deferring a decision or delaying expenditure. Spending departments need to be better informed, drive greater efficiency and be more demanding of agencies and their contractors.

The biggest blockage is, however, funding. Protecting taxpayers' funds and ensuring the economy functions as efficiently as possible are clearly imperative, but all too often this morphs into short termism and parsimony in key strategic areas, particularly investing in transport infrastructure where timescales are necessarily long (although we believe they could and should be shortened). A new approach is needed to address the critical and urgent issue of climate change, which will impact on every aspect of society and the economy. Delivering the necessary infrastructure must be the prime focus and delaying key schemes by crawling through the minutiae of proposals must cease.

Qus.6&7 There are numerous features across all modes of transport where greater digitisation can help and we would support its adoption. We do, however, consider that other measures can sometimes offer quicker and better delivery of the desired outcomes than digitalisation and would counsel that these are not dismissed on the basis that digital is always the best solution. It is a tool in the tool box, an important tool, but by no means the only one: we should identify and adopt the best solution for the economy and the environment in an open-minded manner.

Qu.8 The amount of electricity needed in the UK is going to increase substantially and it is essential that this is generated in the UK to remove our dependence on overseas sources of energy, with the cost and strategic problems they bring. Offshore wind, tidal, wave, solar and nuclear all have a part to play, but most are tied to specific locations and it thus imperative that transmission capacity is enhanced in the most efficient but environmentally sensitive way.

There is an inescapable imbalance of production in often remote coastal areas and consumption inland, and between generation in the North and consumption in the South. If unavoidable, more transmission lines and pylons will have to be tolerated but more imaginative solutions, such as using redundant oil and gas pipelines to carry cables underground, should be explored.

Qus.9&10 Not our area of expertise

Qu.11 Where hydrogen is available as a by-product of an industrial process it clearly makes sense to use it locally, e.g. to power the local bus fleet, and obviate transporting the hydrogen over any distance. It is, however, inescapable that producing green hydrogen is a hugely expensive and energy-hungry process, requiring three times the amount energy compared to using in its prime form as electricity. At a time when we need substantially more electricity, it is highly questionable that producing hydrogen is an efficient use of generating capacity.

In some sectors, possibly including steel making and aviation, there may be no viable alternative to hydrogen, but every effort should be made to minimise the amount of hydrogen that needs to be produced. As we outline in our response to Qu.17, it now seems likely that electricity can be used for most land-based transport purposes in the UK and hydrogen production for use in HGVs no longer seems essential. It is hard to see why hauliers and other transport users should wish to pay 3 times as much for hydrogen as they would for electricity, so long as the latter is a viable option – which it now appears is the case.

The cost differential is likely to be even greater in practice, since the cost of transporting hydrogen from the point of production – generally close to a source of renewable electricity – to the point of consumption is likely to be significant. We understand that adapting oil and gas pipelines to carry hydrogen under high pressure, is likely to be extremely challenging and expensive. It is possible to carry gases cryogenically under high pressure in tankers and this has occurred by rail with butane, propane, nitrogen and oxygen, but the tanks have to be built to a very high specification and are thus costly. This suggests that transporting hydrogen in tankers is feasible but will only be viable for those niche uses in which hydrogen is the only option and not for widespread consumption across many sectors of the economy.

The case is often advanced for hydrogen as an energy storage medium, to store power when it is produced – to an extent dependent on the weather - until it is required. Recent analysis suggests, however, that compressed air is a far more efficient way of storing energy, with surplus power being used to pressurise the air and depressurisation to atmosphere being used to generate electricity when required. It is akin to a pumped storage scheme where water is pumped uphill when power is plentiful and released under gravity to generate electricity when needed.

Qu.12 The translation of Carbon Capture and Storage (CCS) from small scale trials to large scale production has proved an elusive concept. It might have provided a means to allow the continued use of cheap coal to generate electricity but that moment has passed, for several decades at least. As the UK is well placed with offshore wind, it is not clear that there is a major role for CCS, although North Sea oil and gas wells offer a potentially good carbon storage facility. It maybe that it has relevance for one or two niches, like steelmaking and cement, where a carbon-based process is much the most efficient production method and CCS could allow this to continue, in lieu of switching to a much less efficient low carbon process.

Qu.13 Transport networks are often highly susceptible to climate-related failure – the tragic events at Carmont, where a passenger train derailed at speed after a wash out, demonstrated that such failures, generally of earthworks, can have fatal consequences. A much better understanding of structural condition and vulnerability is required, along with a programme of remedial work. This is most urgent along coasts vulnerable to storms (e.g. Dawlish) and/or rising sea levels and along river valleys, particularly in catchments where there is rapid run-off after heavy rain (e.g the Conway valley) or at the confluence of several rivers, where large volumes of water coalesce, such as at Exeter.

We do, however, consider that monitoring systems and the use of the data they generate are capable of considerable improvement. This is one area where digital technology could have a major role, with large numbers of low-cost devices being deployed in vulnerable areas. These would routinely transmit data to engineers for monitoring and maintenance purposes and give an urgent warning to operations control centres if there was a sign of rapid deterioration. In an emergency they would transit an immediate stop message direct to all trains in the vicinity. The communication systems to do this are in place, but much better monitoring and use of data is required to provide effective protection.

Qu.14 One of the current barriers to recycling is the difficultly of effectively segregating waste streams so that reuse and recovery of the relevant elements can take place in a cost-efficient manner. There needs to be a greater investment upfront in products from food packaging to electronics that are easily recyclable, and in the high-volume material recovery facilities to process the recyclates.

There are already many instances of waste being transported in an energy efficient manner by rail for recycling and reuse. More than a million tonnes of steel scrap are transported to steelworks in the UK or to ports for use overseas. The same could apply to other recycled products such as paper. London, Manchester and Liverpool all send residual domestic waste, after the recovery process has been completed, to Energy from Waste plants by rail. There is considerable scope to extend this to other cities and groups of towns, to put an end to landfill and the greenhouse gases it generates. It can and should be used for commercial as well as domestic waste. Higher taxation of waste material that is landfilled or otherwise dumped would probably be the most effective way of incentivising change.

Qu.15 Similarly, these and other cities send large quantities of inert building waste by rail for land restoration, to fill voids left by previous mineral extraction. This is made up of fines left after any aggregate has been recovered from demolition waste and clays from urban excavations, such as deep foundation work or basement excavations. As with domestic waste, there is considerable scope to extend and incentivise use of this system.

However, as stated in our answer to Question 3, the reuse and repurposing of buildings must become the default assumption, rather than the demolition and rebuilding, to significantly reduce carbon emissions from construction and transport.

Qu.16 CILT has long advocated road user pricing as a means of addressing many of the challenges in transport and this is particularly true in urban areas. Congestion charging and work place parking levies have both been found to be effective, provided there are sufficient levels of affordable public transport available, and we are convinced that full-scale road user charging should be introduced at an early date. The monitoring and charging technology is now readily available and research suggests that most people would accept road pricing so long as it was in lieu of fuel duty and not used to raise extra revenue for the Exchequer. The notion that those who use the roads most should pay most is 'felt fair', with additional charges for those who use their vehicles in a way that generates external costs, such as congestion and poor air quality (particulates from tyres as well as pollution from engines) in urban areas. A battery-powered traffic jam is still a traffic jam, with all the waste and inefficiency that goes with it.

Charges can and should be varied through the day to regulate demand and in rural areas, where traffic is very light (and there is no alternative to the private car), charges could be set at a very low level. Charges should also relate to the cost of using alternative public transport to avoid the misconception that road user charging is simply an additional tax on movement. It may also be sensible to incorporate Vehicle Excise Duty into road user pricing, or at least reduce it to the level that covers the cost of issuing licenses. In any event, with the progressive demise of fuel duty, an alternative means of collecting revenue from road users will be necessary and we believe electronic road user pricing is much the best option.

Alternatives to private car use vary according to size of the urban area and will usually involve a combination of modes, integrated to produce a seamless system with common ticketing. The options range from heavy rail through metro, light rail, tram/train, tram, trolley bus, bus and demand-responsive minibus to taxi, motor cycle, cycling and walking. Devolved authorities/urban mayors are generally best placed to determine the optimum mix for their area/region, although it is important that all options are considered objectively to avoid 'hobby horse' solutions being adopted. A key task will be to eliminate diesel trains from dense urban networks in the Midlands and the North, plus the Chiltern route by means of electrification - battery and hydrogen trains are unsuitable for such routes.

Mass transit systems work best through encouraging high levels of passenger use through key transport corridors. This is achieved through a combination of factors including journey time (particularly compared to private transport), location, frequency, ease of interchange and, of course, cost. Those cities around the world that have an effective multi-modal mass transit system have generally given priority to the public transport services, even where there is no significant road charging system. They generally focus on transporting passengers to nodal points or significant places for public travel, such as hospitals or commercial centres. A multi-modal ticketing system also allows passengers easy use of the different modes, removing the barriers caused by having different tickets for different modes or even for different operators within a single mode.

In order to compete effectively against private car travel the right modes of public transport need to be deployed including ensuring that there are sufficient feeder services which can bring passengers into the main urban arterial routes. Often light rail or metros can provide a "steel spine" which is able to carry the heaviest loads, with buses and DRT services providing feeder routes to convenient and well operated interchange hubs. Within an urban setting having sufficient stops in locations to provide the right level of convenience is also important. Good examples of the use of light rail in the UK include Nottingham, Manchester and Birmingham although all are hampered by the lack of coordination with privatised bus services. This is, however, an area which is being improved through the UK Government's recent National Bus Strategy, which is mandating the involvement of local transport authorities and greater integration between bus and both trains and trams.

An advantage of light rail is that it can operate both on traditional segregated lines and also run directly through the streets of cities, providing greater connectivity. Its benefits of lower cost infrastructure when compared to traditional heavy rail means that it can operate in urban, suburban and rural locations and over significant distances. There are numerous examples of light rail services, particularly in Eastern Europe which combine services running in all three areas.

A sustainable, ongoing funding mechanism for any public transport network is critical. London became the third city in the world after Singapore and Hong Kong to rely only on fare revenue in 2019. However, the impact of the delays to Crossrail/Elizabeth Line, followed by the Covid pandemic means funding levels have plummeted requiring government bailouts. Otherwise, a desire by government to 'bring the rest of the country's public transport "significantly closer" to London standards' as one of the missions of the levelling up white paper is unrealistic.

It is essential that freight and logistics in urban areas are considered as well as passengers – delivery trucks and collection vehicles have a vital role in sustaining urban life: providing food for people to eat and removing the waste. However, there are very few instances of effective or efficient demand management of urban freight traffic and maximising the consolidation of deliveries – in fact technology is leading to a rapid fragmentation of deliveries which risks increasing congestion and the complexity of vehicles and uses on urban streets.

Cheapest for the consumer and the most efficient use of energy to deliver food, volume consumer goods and bulk deliveries, such as aggregates and concrete, into an urban area - and move waste and recyclates out - is likely to be rail or water. Clearly, electric HGVs would be needed where those modes are not available or more flexibility is required. Fortunately, such electric vehicles are now becoming available for local and regional distribution, although not for long haul trunking.

To achieve this, land use and transport strategies need to be integrated to maximise the use of rail and water, and enable changes to the timing of deliveries and routes used by large commercial vehicles, which can be hazardous to other road users on city streets, particularly cyclists and pedestrians. Schemes which seek to introduce smaller, cleaner and quieter vehicles may be beneficial in specific towns or neighbourhoods, but small vehicles can't deliver everything: cargo bikes have a role to play, but in a very small niche

Very few planning authorities in the UK fully address freight in any meaningful manner. If they do consider the impacts of land use on freight transport, it is not at the local level: how the kerbside functions for deliveries as well as cyclists, bus lanes and pedestrians, and the impacts and links between local delivery and local land use.

The current situation involves a mix of very large (diesel) HGVs, a wide range of different van fleets, and a plethora of unregulated cargobikes and 'last mile' vehicles competing for street and kerb-space. The former are well suited to long distance trunking and driven by trained drivers but are fundamentally unsuited to urban streets. Van fleet numbers are increasing and, along with the latter, are currently attempting to satisfy consumer demand which is rising unsustainably. At some stage, consumers will need to recognise that they can't have everything delivered to whenever they want it without using more resources than the planet has available, and no urban area can provide the road space and logistics facilities ad infinitum. A useful first step would be to flag the carbon footprint of an express Prime-type delivery when a customer is placing an online order, to cause them to consider the consequences of their actions.

Deliveries by smaller vehicles require industrial and logistics premises in urban areas, but these facilities and land use classes (B2 and B8) are disappearing rapidly, rents are rising fast and the market is not functioning efficiently, as recently identified by Savills and JLL. With the rise of meal delivery apps and '15 minute' grocery deliveries, retail and restaurants are disappearing from the High Street. In their place dark kitchens are appearing on industrial land (B2) and new users are seeking logistics land (B8) which is cheaper for them, but this is pricing-out logistics uses. The nature of logistics activity means it cannot backfill the abandoned High Street locations in land use class (the old Class A1-A3).

Despite the range of approaches between countries and cities there is a commonality to retailers offering shorter lead times and a political desire for cycling and walking and smaller delivery vehicles. Most countries are struggling to resolve this dilemma, although specific examples of good practice do exist, e.g. Paris has a very good land use strategy for logistics.

To tackle the land use issue, the alternative would be to move to a 'containerisation' of urban deliveries. This would involve a multimodal system based on swap bodies that can be transferred easily from rail to road and vice versa. These would be loaded with 'picked product' (goods ordered by a store) at a remote distribution centre (DC) and moved by electric train to a simple transfer point on the edge of a city. Here they could be lifted by electric forklift or gantry onto rigid battery trucks specifically designed for urban operation. The swap bodies would typically be 6-9m long and could be refrigerated if required. A smaller swap body of 3-4m would be suitable for home deliveries and could be lifted onto a battery van chassis for the final leg. In all cases, return materials such as packaging and empty cages could be loaded in the swap bodies to be taken back to the DC for reuse/recycling.

This would produce a completely decarbonised supply chain into and out of the urban area and – in contrast to the consolidation centre option - one in which goods were not touched between the DC and the store, or the consumer's front door in the case of home delivery.

Such a system could well allow retailers to take cost out of the supply chain by improving productivity and efficiency through reduced handling of product.

Qu.17 Interurban transport is at a cross roads, especially with freight and logistics. It is essential that well-informed choices are made in the near future if the UK is to have an efficient zero carbon distribution system that maintains and ideally improves the high level of supply chain efficiency currently delivered.

The options for interurban passenger transport are fairly clear. Private cars will be battery powered and should pay for their use of infrastructure through electronic road pricing, with charges set as outlined above. These would by linear, making longer car journeys much more expensive than short trips and could be weighted according to the section of road to discourage use of private cars in certain areas through the price mechanism. Interurban coaches, although small in number, will probably be battery powered.

Interurban journeys on the main Inter City routes are already largely electrified and there is no viable alternative for long-distance high speed trains. With recent announcements in the Integrated Rail Plan, the remaining mileage of main Inter City routes that will need electrification has reduced to c.600 miles. The main element of this is the Cross Country route from Leeds via Birmingham to Bristol and Penzance, plus Coventry to Oxford and Basingstoke. The remainder is mostly made up of the London-Plymouth route between Newbury and Taunton plus Chippenham to Bristol and Cardiff to Swansea.

Away from these main Inter City routes, other decarbonisation options are available. Battery technology has now advanced to the point where a range of 100 miles can be achieved at speeds of up to 75mph, with intermediate station stops. In addition, rapid recharging within 10 minutes is also possible, meaning that many rural and lightly used regional services could be decarbonised without the need for electrification. This includes the routes that were identified for hydrogen trains in Network Rail's Traction Decarbonisation Network Study (TDNS). As a broad indication, we would consider two trains an hour or less as battery routes, with electrification being justified above this level.

Interurban freight is generally considered to be a much more intractable challenge, but this is starting to change. The first battery-powered 37-tonne articulated HGVs entered service in late 2021, with a range of around 100 miles and the rapid improvement in battery technology suggests that this will increase further. OEMs are confident of 200km (125 miles) range in the next year or so, meaning that out-and-back trips of 100km each way will be possible without recharge. DfT road freight data demonstrates that 61% of all road tonnage moves under 100km and could thus be moved in battery trucks in the very near future.

In parallel, much faster charging is becoming available and partial recharging at destination, whilst the truck was unloaded, would extend this range. 150km each way would seem plausible in the relatively near future and this would lift the proportion to almost 75% of all HGV tonnes. Further improvements in battery technology are highly likely and 200km each way does not seem out of reach, which would encompass 84% of all HGV tonnes.

Further analysis of the DfT data suggests that around 15% of current HGV tonnes are likely to be suitable for modal shift to rail. This is made up of most trips over 200km, plus a proportion of bulk materials like aggregates moving over 100km – both are already undertaken by rail in the UK on a daily basis.

Adding this capability to the scope for battery trucks outlined above accounts for a very high percentage of current HGV tonnes – very probably c.90% and possibly as high as 95%. The small remaining element could be operated by recharging en route or, more likely, trailer swaps, with a fresh fully charged tractor unit attached for the next leg of the journey. This suggests that other potential solutions to decarbonising road freight which are under consideration, such as hydrogen and the e-Highway (motorway electrification) – both of which face considerable operational and safety challenges and would require substantial investment in infrastructure - may be unnecessary.

Doubts are sometimes expressed about the ability of the rail network to accommodate significant modal shift, but substantial increases in train size over recent years make this less of an issue. The average freight train now conveys the equivalent of 76 lorries and even with light consumer goods 50 HGV loads on one train is common. This means that, with modal switch of 15% of HGVs to rail, most main lines in the UK would see one or two extra freight trains an hour in each direction. Given reduced levels of business travel and long-distance commuting post Covid, this should not be difficult to accommodate.

Two routes – the West Coast Main Line (WCML) and Felixstowe to Nuneaton (F2N)– would see three or four extra freights an hour, but HS2 frees up substantial capacity on WCML and a well-documented package of enhancements would provide the necessary capacity on F2N. These would eliminate sections of single track on the route, which are the equivalent of the A14 having one lane for both directions, this on the route from Britain's leading container port – and a Freeport to boot. F2N presents the single biggest opportunity for modal shift in the UK and, with removal of the capacity constraints, could take over 1000 HGV trips a day off the A14. The improvement in productivity and reduction in carbon emitted would be substantial, even using diesel locomotives in advance of electrification. This would save around 70% of the carbon generated by HGVs currently used and, given a supply of renewable or nuclear electricity, electric locomotives would save 95% of the carbon emitted at present.

A high proportion of freight is currently hauled by diesel locos, but these become due for replacement from 2030 onwards. The private sector Freight Operating Companies are prepared to invest in powerful new electric locos (with battery last 5/10-mile capability) but only if Government invests in freight electrification to enable their use. Fortunately, around two thirds of the core freight network is already electrified and wiring another 700-750 miles would allow c.95% of freight to be electrically hauled. Crucially, around 250 of these miles are common to the Inter City electrification programme outlined above, so the incremental freight electrification is only c.500 route miles.

Electrification costs have come down significantly since the very poorly managed Great Western scheme but can go down further still, especially on freight and regional passenger routes with speeds up to 75mph. Compared with the £1m per single track kilometre currently being achieved, recent work suggests a cost of c.£500k per stk is achievable, with slower speed lines up to 40mph coming in at c.£300k per stk. At these prices, the incremental 500 freight route miles could require an investment of no more than £800-900m and the full 700-750 miles freight programme around £1.2-1.4bn. The latter would, of course, reduce the cost of Inter City passenger electrification commensurately.

We conclude from this that decarbonisation of interurban freight is feasible using proven electrically powered technology, with battery trucks for short and medium distance trips – essentially local and regional distribution – and electric rail haulage for long distance trunk movements. The use of intermodal equipment, such as containers and swap bodies, allows a seamless transition between the two modes and obviates costly handling and transhipment. Land use planning policies and practices need to identify and facilitate sites for modal transfer, but much of the investment in intermodal terminals will come from private sector commercial property developers. This is particularly the case with major rail-connected warehousing complexes (Strategic Rail Freight Interchanges – SRFIs), which are a key component of multimodal interurban freight and the modal switch needed to decarbonise trunk haulage.

We trust this consultation response will prove useful and would be happy to provide further input or answer any queries you may have.

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