UK Freight
In for the long haul?

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UK Freight: In for the long haul?

Introduction

To remain internationally competitive, the UK needs a robust and resilient transport system. The UK relies on intelligent support to provide a world-class, fully sustainable freight and logistics sector. The challenges of population growth and changes in consumer behaviour need to be managed alongside the introduction of new technologies.

During 2015 the Institution of Mechanical Engineers conducted a series of workshops across all freight stakeholders, to gather the views from a wide range of transport and logistics specialists. The consensus is that our transport network and infrastructure are not fit for purpose to meet our future needs. Policymakers need to address the issues that are blighting performance, and impacting the UK public. These key issues include: congestion that affects everyday life; emissions and air quality that affect the public’s health and well-being; and an imbalance between transport systems that threatens economic growth.

The evidence is that free market economics will not, on their own, provide the optimum productivity to deliver efficient solutions, and many logistics stakeholders believe that they are being penalised by the way Government approaches planning, investment, taxation and regulation on the transport network. Government is clearly a major stakeholder and player. The new approach we suggest in this report will make it easier to do business, improve sustainability including health-related air quality, and make the UK and its cities more attractive places to live and work.

Evident failures from the current approach include estimates of congestion costs to be about £13bn per annum, with an estimate of up to 29,000 premature deaths each year due to poor air quality. As an example, there are on average 150 million preventable lorry miles each year due to poor route selection. The system grows ever more vulnerable at key points, as illustrated by the frequent disruptions to Channel Tunnel services during 2015.

The Institution welcomes the creation of a National Infrastructure Commission. We recommend that it adopts an integrated approach that recognises the changes in the system that are not infrastructure-led, but may well require infrastructure modifications (for example electric vehicles, electrified rail connections to ports). Encouragingly ‘Transport for the North’ already recognises the need not only for individual upgrading of road, rail, sea and air, but also for a “Northern multi-modal freight and logistics strategy to inform future development of transport investment”.

With transport producing 25% of UK greenhouse gas emissions, there needs to be a holistic approach to emissions reduction set as a parallel objective. Implicit in the development of a national strategy is the importance given to low-emission vehicle development, and emerging technologies such as autonomous vehicles and platooning of lorry flows on motorways. The significant improvements in the air-quality emissions performance of new freight vehicles over recent years, particularly with the latest generation of Euro VI vehicles, now need to be matched by similar improvements in fuel efficiency.

We have identified barriers that need to be considered in the design of the process. Key to these are the generation and co-operative sharing of information. Indications are that understanding of significant flows in terms of value, volume and mass is inhibited by lack of complete origin and destination data, some of which is seen as commercially sensitive. Productivity and efficiency are inhibited by slow adoption of computerised systems for goods

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tracking and documentation, although the evidence for this is largely anecdotal. Historically, it is likely that differing fiscal imperatives have become embedded and insulate providers from their full external costs. Complete UK metrics are not easily available. Similarly some emissions regulation may have slowed the adoption of the best technology. Access costs for new rail connections seem very high, and emerging signalling technology may not help. The apparent preference for short sea crossings is introducing far too many goods into the country via the South East ports, adding to congestion on key road routes around London.

We have therefore created this series of five short papers looking at the key issues of:

- Future-proofing the transport network
- Creating a joined-up approach
- The introduction of new technologies
- Environmental impact
- Skills challenges

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Paper 1: Future-Proofing the Transport Network

The UK population is predicted to reach 77 million by 2050, by which time it is estimated we will be the most populous country in Europe. This growth will lead to an increase in demand for all goods. There will be a growing expectation from society that what we order one day will be delivered the next, if not before, and that there will be a greater choice of products, meaning we will be importing what is rare or out of season.

These commodities and consumables are distributed by the UK freight and logistics sector, estimated to be worth over £100bn to the nation’s economy, and providing employment for about 2.3 million people in the UK across 196,000 companies. While this represents one in 12 people working within logistics, many stakeholders within this sector believe they are the forgotten component when it comes to investment in the UK’s transport infrastructure.

In terms of both people and economics, the Government is a major stakeholder. According to the World Economic Forum, the UK ranks 13th for the quality of its overall transport infrastructure. So to remain competitive in the future, our transport network needs upgrading to deliver a service that is efficient and dependable. The UK must continue to attract foreign investment, so businesses locate and grow their European hubs here. To support this, our

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transport network must have sufficient multi-modal and intermodal capacity, both en route and in terminals. Failure to ‘future proof’ our logistics sector is likely to significantly restrict social and economic growth. Graph 1.1 shows how the UK moves goods around the country by its various modes. This breaks down to road freight moving 68%, with rail taking 9% of the market share, waterborne (mainly coastal) at 19% and pipeline at 5%. The Department for Transport is forecasting that by 2035, freight traffic on our roads will have grown by 20% and the number of LCVs (Light Commercial Vehicles) will double. In addition to the importance of our surface transport, road and rail to internal movements, 95% of the UK’s international trade moves through our seaports, which must be ready for growth.

Planning

After the General Election in May 2015, power over transport planning for UK cities was devolved, giving cities and regions greater control over traffic flow, including freight. However, the fundamental principles of system engineering tell us that independent efforts without an overall strategy will not lead to optimal national results.

Therefore there is a need for Government to work with local authorities to ensure that the UK has a joined-up, future-proofed network. By working with these regional stakeholders, Government will understand the varied needs and different priorities relating to their role in commerce and manufacturing. This will help with the formulation of a long-term national strategy that will inform decisions, while maximising the utilisation of the UK transport network.

The ‘Transport for the North’ programme of work is currently investigating, among other initiatives, the rail network access links on key routes (for example Manchester to Leeds). Currently 95% of Manchester’s freight is on the road, due to its geography and the distances being moved. Network Rail and Transport for Greater Manchester are looking to consolidate modes by reviewing the passenger train timetable, hoping to free up freight capacity. The ‘One North’ programme has two strategic priorities: firstly driving economic growth and secondly looking at improving their environment through addressing the externalities of current activities and future growth. This work will benefit the region by helping them optimise their network to provide for growth, not wasting valuable capacity, and yet will improve air quality.

Currently 65% of the UK population lives within a 150-mile radius of Liverpool Port. However, 91% of our deep-sea volumes enter or leave via either Southampton or Felixstowe (Picture 1.1). This is estimated to equate to 150 million wasted road miles, 200,000 additional truck journeys and creates about 0.2 million tonnes of unnecessary CO₂ emissions.

Better understanding of future traffic flows: where goods are going to and from and why, is essential to good decisions. Unless we change some current patterns, developments such as the Northern Powerhouse will be choked by congestion in the South East, hindering productivity and efficiency on a wide front, to the annoyance of many who will see their journeys delayed as a failure of Government.

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Capacity

The provision of effective freight transport capacity and reliable journey times is a key priority to support growth. Short-term gains can be achieved through the use of latent capacity in existing networks. However, this requires high levels of collaboration, the need for which will grow as consumers drive new demands. Graph 1.2 shows the breakdown simply by freight tonnage moved within the UK by the transport modes. This shows in sharper relief the over-reliance on our road network. Graph 1.3 shows the split by commodity type with rail being used for bulk movements (materials and containers) from node to node, and then road being used for lower density distributive tasks. Local impacts are substantial. London generates £323bn per annum \(^{10}\) to the economy, but to operate has to accommodate 265,000 freight vehicle visits every day.

Graph 1.2 – Department for Transport freight statistics – Table TSGB0401

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\(^{10}\) FTA. Logistics Report. s.l.: FTA, 2013.
At any given moment in time, between 28% and 30% of haulage vehicles are driving around empty. Many of these vehicles operate on logistical tasks where a return load is impossible. For example, tankers carrying oil between refinery and retail outlet, or transporting milk between farms and processing plant. Making better use of urban consolidation centres (UCCs) would help avoid partially loaded vehicles from making unnecessary deliveries in urban areas and therefore reduce the total volume of goods vehicle traffic\(^{11}\).

These UCCs could have a particular role in relation to relevant ports and airports, being connected by improved and appropriate modal links, both rail and inland waterway. An example of this can be seen through the work being done with the Atlantic Gateway. This is based on unique sea and inland waterway assets between Liverpool and Manchester. New consolidation centres would be able to make use of brownfield sites and fit in with regional plans for movement of both goods and workers.

Other ways to reduce empty running are to encourage ‘horizontal’ collaboration between operators: to carry return loads for one another, or online vehicle load brokerages, which can arrange return loads on an ad hoc basis. The UCCs could potentially help with these horizontal collaborations.

It is fully understood that the need for logistics companies to share data openly will cause concerns over competitiveness and commercial sensitivity. Intermediary providers such as Network Rail could, however, potentially manage this data to help improve network efficiency while addressing those sensitivities. Providing access to such data would facilitate

\(^{11}\) Royal Academy of Engineering. The transport congestion challenge getting the most out of the UK’s road and rail networks. November 2015.
collaborative behaviour where beneficial, and assist the planning for significant infrastructure upgrades, such as HS2, maximising their potential to release capacity for freight.

Our logistics network experiences bottlenecks in both capacity and time delays. A prime example is the inefficiencies that can occur with the unloading of aeroplanes. Here the air mode would benefit from learning methods that have been implemented by the seaports. Ports have invested in their methods of freight loading and unloading, resulting in turnaround times that have been reduced to as low as 25 minutes, due to the technology they have adopted. Currently turnaround time on our freight planes can be up to five hours.

Safety

Safety is paramount to those working within the freight and logistics sector, in terms of both movement of goods and vehicle design. For those who use road haulage, safety can become an issue for prime customers, who will subcontract a logistics company to move their freight, which in turn uses third and fourth parties down the distribution line. Prime customers often invest large sums of money into producing engineering guidelines and safety processes, intending a cascade to all involved in the operations. However, freight users cannot always guarantee that these processes flow down through their subcontractors, with impact on both process and road safety.

Online example: CLOCS http://www.clocs.org.uk/about/ Between 2008 and 2013, 55% of cyclist fatalities in London involved a heavy goods vehicle. A disproportionate number of these were construction vehicles. In 2012 Transport for London commissioned an independent review of the construction sector’s transport activities, to understand the causes of these collisions and how they might be prevented.

Online – Best practice guidelines produced by Society of Operations Engineers (SOE) http://www.soe.org.uk/resources/technical-guides/

Technical Guides

Promoting best practice

As part of promoting best practice and improving safety standards, the SOE has produced a series of Technical Guides. There are 13 to date on issues such as tyre maintenance, tachograph maintenance, tipper stability and vehicle rollover.
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Paper 2: Creating a Joined-up Approach

Our stakeholder engagement revealed a wide range of issues and opportunities, ranging from the long-term and strategic technology choices, to key local influences on customer behaviour and decision-making. This paper summarises these together with examples of best practice that would have value in being shared. The responses illustrate the complexity, yet crucial importance, of a national approach.

National Infrastructure Commission

The Institution and stakeholders that have contributed to this research document welcome the announcement, made by George Osborne in October 2015, of the formation of a National Infrastructure Commission (NIC). When assessing the transport network, this Commission must not only look at the infrastructure provision, but also take into account significant changes in vehicle technology and traffic flows for new markets. The Commission will need to work with all stakeholders from customers, to regulators, to operators, to suppliers as well as engaging with existing industry groups such as the Rail Delivery Group, Rail Supply Group and the Automotive Council.

Making it easier to move things

Logistics service providers work with their customers to understand what influences the decision-making process into choosing a particular mode of transport. The decisions come down to three key drivers; however, these will vary between customers depending on end-user requirements, for example the component delivery to automotive industry has a higher service element than the movement of raw or semi-finished materials in other sectors:

1. Cost
   In some markets, economies of scale can be the driving force behind the choice to use freight. Customers focus on the total cost of logistics or the end-to-end journey. High-end technology or high-value goods, for example mobiles and electronic tablets, are often moved by air freight, particularly if delivery is time-critical. On the other hand, customers moving large amounts of bulk material are usually driven by the required flow of material needing to be shifted. Their selection process is critical, as transfer movements between the modes cost time and money, for example if goods have to move from road to rail to road. This may cause them to choose to do the whole delivery by road.

2. Reliability and efficiency
   Customers need reliable and efficient logistic services, the mix depending on their contracts and product. Gains from new vehicle technology should be encouraged and incentivised. Understandably, within the sector many believe there needs to be a rebalancing of Government priorities between passenger and freight. However, key planning processes for rail and road need to include forecasts for both and an overarching strategy, should inform and support these, not override them. An example is the Long-Term Planning Process for the rail industry, which is based on ten-year and 30-year forecasts for both passenger and freight traffic.

3. Availability
   The resilience of our transport network is critical to ensuring that our components and commodities are delivered as required to end-customers. Scenarios that affect this availability such as extreme weather, causing road closures or railway delays, can very
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quickly lead to interruptions in supply with substantial consequences. Availability is dependent on free capacity on our infrastructure and we need to ensure that there are diversionary routes of the right capability (for example suitable loading gauges for alternative rail routes).

Timing, routing and resilience

Managing the flow of our freight around the UK could ease congestion significantly and ultimately reduce transport emissions. The timing and routing of our freight can be optimised through better analysis of data and a consistent approach to the way we use metrics across different modes of transport and different regions. Solutions such as implementing charging zones for road users based on emissions can have the right outcomes if done correctly. The ‘Out of Hours’ delivery that was adopted during the Olympics, was a good example of how things can be done differently to use spare capacity at night.

Through the development of a national freight strategy, there would be a consistent approach to regulation. Without this top-level commitment, our infrastructure and traffic flow practices will remain disconnected. An example of this could include the introduction of low-emission zones, which is admirable as long as there is an area where companies can switch to lower-emission vehicles, such as a distribution or consolidation centre outside the city or borough. Without this coherent approach, businesses working within those low-emission areas are the ones which will be penalised and may relocate rather than improve.

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\text{Seven-day railway: Route resilience for maintenance}
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\text{Stakeholders believe that a significant review of the timetable path allocation and infrastructure investment is needed to take account of the economic value of using particular paths for rail freight routes. There is a suggestion that many would like a seven-day-a-week railway. To achieve this, better access to diversionary routes is needed when engineering and maintenance work is planned. Currently some intermodal routes have issues such as limited gauge clearance, so this would need to be resolved. A clean-up of the timetable freeing up unused or under-used freight paths, needs to be done. Maintenance of infrastructure is necessary, and the access time needs to be mapped out in a better way so as not to block multiple strategic freight paths simultaneously, thus giving viable alternative routes during maintenance periods.}
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The UK must have an infrastructure that is resilient. Deterioration of transport infrastructure is caused by a variety of issues: high axle loads, vehicle speed, gross tonnage and the weather. When building new infrastructure, it must be future-proofed with a scheduled maintenance plan. Tracking and forecasting the number and weight of vehicles on our road and rail networks can be done reasonably accurately, and damage can be reduced by incentivising the use of ‘track’ (road and rail) friendly vehicles.

Resilience of our transport network due to the weather is one of the harder challenges that the NIC will have to plan for. With a projected forecast of a rise in maximum temperatures, there is a risk to our rail track that temporary speed restrictions will limit network capacity. Road surfaces may need to be maintained and repaired more frequently. Alternatively, a change in design is needed to improve robustness against the increase in heat input on very warm days.

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Predictions see higher rainfall intensity and more flash flooding, particularly in summer. This will increase river flooding and potentially more landslides, leading to more electrical equipment failure. Rising sea levels and an increase in rainfall can mean greater damage to coastal infrastructure; for example, when the rail line through Dawlish was closed for two months in 2014 after severe storms and took £35m to repair13.

The UK needs to identify and strengthen infrastructure at risk. Decisions on mitigating measures that can be implemented to minimise disruption and limit the consequences, need to be made. Examples of tactical efforts include improvements that enhance flood resilience and improving the maintenance regime.

Telematics

The 21st century is the time for adoption of smart mobility. This is the smart use of information between vehicles, between vehicles and infrastructure and between vehicles and logistics systems in order to improve efficiency. Actions that can be taken include predictive cruise control, preview shift strategies, platooning, and dynamic route planning including time slotting14. All these technologies, which use telematics functionality, are now available and their implementation will drive the way our goods and services are moved, thereby providing a personalised service. Changing the mobility of goods, however, requires societal changes, with companies changing the way they do business, and turning freight movement of the future into multi-partner solutions.

Over the last decade, the use of telematics on the rail network has led to some improvement in signalling and train control systems, and much more is planned, allowing capacity of a track layout to be increased. However, on the road network, the take-up over the last ten years has been relatively slow. Some parts of the country do have sections of intelligent motorways, which make use of active speed management to maximise capacity on existing infrastructure, but, where cost-effective, this needs to be implemented more widely.

Telematics technology is used by all the transport modes, and is relatively easy to implement and cheap to develop, but can be hard to co-ordinate. Making use of telematics through tracking of freight seems to be very customer-dependent. For example, DHL tracks all its freight and has generated an expectation from customers, with on-board systems monitoring driver performance, load and sign-off on the arrival of the goods to the customer.

Some logistics providers are way behind consumers’ adoption of technology, an example given was in air freight. Here a distinctive lack of automation means that movement of goods still needs large amounts of paperwork and documentation sign-off. This seems archaic when compared to the automated movement of passengers with online check-in, ticketless travel and increasing use of the smartphone. Air freight technology is almost 20 years behind what is happening with passenger movement. Research in America has estimated that a significant proportion of the labour productivity increase in railroad shipping has come from the automation of administration. It is highly questionable whether this has happened in the UK, or if we even have the data available to inform the research15.

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Matching infrastructure investment

The UK needs better information on the geotechnical make-up of the foundations of our infrastructure, in order to understand the risk from events such as landslides. This is of prime importance, as our vehicles develop and our transportation methods become more specialised. Our vehicles may become less flexible and more complicated to use, so potentially harder to integrate into a legacy network. These may lead to loading/unloading problems in terms of having the right equipment or infrastructure in place to manage them. If there is a requirement to move to heavier lorry axle load, then there would need to be significant investment in our road infrastructure to deliver the necessary resilience.

Currently the quality of urban rail freight terminals is good; however, if the forecasts are correct, then it is likely that we will see growth in intermodal freight that will need to be delivered into cities. Currently there are not enough sites reserved for development of the necessary terminals.

Modally appropriate

To encourage users to consider alternative distribution transport modes, we need to ensure that what is deemed a complicated logistics system, is made simpler for customers to understand. Currently road transportation methods are often seen as the most attractive as they appear simpler, offering flexibility and route availability, enabling them to be more competitive on price and delivery. Rail operators and in particular Network Rail need to work with industry, to look at what more it could do to help reduce the cost and timescale of providing rail access to freight terminals, with work done at local level to examine the cost benefits for regions to improve their access points. This could include making access to the rail network from existing lines, such as those at disused quarries, available for other industries.

Our manufacturing base needs to be competitive in terms of price for factory set-up, as well as being able to offer the right skills to support these hubs, but most importantly we need to be able to offer cost-effective and reliable distribution networks. The UK needs to link up the modal strength of rail with the good distribution methods of roads, and match this to our export capability through easier access to ports and airports. The UK does not currently look at modal external costs in a joined-up, modally agnostic fashion, but instead has strong modal

Learning from other countries

Every morning 300 to 400 tonnes of perishables arrive by plane into Heathrow and pass through border control run by Hillingdon Council. An example of some of the perishables are beans that are brought in from Kenya. They arrive at 6am and could be through customs within the hour, but instead they take samples, put them onto a courier’s motorbike and take them to a laboratory in Cambridge, where they are inspected for quality. This process takes about 24 hours. It is then up to customers to pay to have these goods delivered to the end-point and put out for sale, taking another day. However, in Frankfurt they have made an investment in the airport and allotted space for people and laboratories and the process takes only three hours. They can then load it onto a truck and deliver it to, for example, Leicester in less time than it would take to ship it directly to the UK by air.
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Better use of our port network could add value. For example, Port Salford is under development, receiving £138m of investment to become a new tri-modal (road, rail and short-sea shipping) site. Phase 1 of the construction project has been approved and is looking to develop further as the Gateway to the North. It is a pilot project, but there are plans already looking at expansion routes into the city centre and within the regional centres. Port Salford is very close to the Trafford Centre (the second largest shopping centre in the UK), and it has links to other waterways. Predominantly the investment comes from the private sector, with the aim to have a split of 10% water/60% rail/30% road by the end of Phase 1. It is a port that has rail connections; an initial scoping exercise into whether there is an opportunity for creating an encapsulated pipeline option (the Mole)\textsuperscript{16} which would go into Manchester, is welcomed.

Multi-modal options backed by the right infrastructure can work very well. The UK currently has a strong growth forecast in the rail movement of intermodal (container) traffic, based on better and electrified links to ports accommodating the largest containers. Regional developments will help to avoid the inappropriate use of South East ports for goods destined for the Midlands and North, as long as they are supported by the appropriate fiscal and charging regimes. Transferring freight by sea from port to port is another potentially attractive but under-utilised option, particularly as much of the infrastructure already exists.

\section*{Modal shift}

\begin{quote}
Jaguar Land-Rover (JLR) did a cost analysis for moving freight by rail from Hamburg to China through Russia. However, from the analysis it was found that sea freight still worked out cheaper. Impacts of fuel costs/rises/taxes are all just seen as part of the cost of shipping. There is a tipping point where JLR would move its manufacturing facilities elsewhere. However, the cost of sea freight is not going to stop it going to shift large bulk items. Rail may be quicker but the reduction in lead time didn’t compensate for the higher costs. It endeavours to use freight on rail, but it is currently a less flexible option as it is limited to movement at specific times. However, the only way it can support movement from its suppliers is through the movement of trucks, because they offer a flexible mode of transport. JLR has high aspirations to reduce its carbon footprint and is working towards more sustainable methods and movements.
\end{quote}

\section*{Government activity and contracts}

Governments can leverage without having to legislate. Large infrastructure projects such as the Olympic Park development, Crossrail and HS2 all require large volumes of heavy building materials delivered (and spoil removed) in a timely and environmentally sensitive way. The rail network has a significant role in moving bulk flows of construction materials. Such projects need tough and regulated standards for emissions that operate through the supply chain and drive all subcontractors to use vehicles that meet the latest safety and emission standards.

A national freight strategy will help infrastructure upgrades to be built on comparable data, analysis and statistics from across all modes. It will provide consistency across the modes and signpost the fairest way to implement route charges, reservation charges and alternative

\textsuperscript{16} http://www.molesolutions.co.uk/
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route (as well as mode) options. Developing a common metrics tool could help inform customers on issues such as cost, duration of transport and emissions. Long term, the European Commission has an objective to internalise the external costs associated with each mode of transport. Currently the position represents a form of hidden subsidy for some flows. Stakeholders have identified a number of cross-cutting issues that will strongly influence creating a joined-up approach.

Regulation and standards

Most freight is moved at some point on its journey by road, while imported finished goods will have used at least one, possibly two other modes of transport as well. This demonstrates why it is critical that we have an integrated approach to logistic flows. Currently there are inconsistencies due to historical, fiscal and regulatory interventions. Over the last 20 years diesel truck manufacturers have been focusing on particulate and oxides of nitrogen, but there is a parallel need to further limit CO₂ emissions to mitigate the effects of climate change. The European Union (EU) is currently working towards a Heavy Duty CO₂ regulatory framework; however real change for trucks is not expected until the next decade.

There is some evidence of inappropriate regulation inhibiting the best available technologies. Rail has, and will maintain, advantage in energy use and associated emissions. Nevertheless, the Euro IIIb standard limits the choice of available engines for freight locomotives, and presents a barrier to investment in new locomotives, with companies preferring to use their older, more polluting vehicles by exercising grandfather rights. The product lifecycle of a rail freight locomotive extends to 40 years and beyond – currently some 20% of the UK locomotive fleet is between 40 and 50 years old. Allowing new locomotives to the older Euro IIIa would be a better, cheaper and more widely adopted alternative, with environmental benefits capitalising on rail’s modal advantage. While accepting the need for all modes to improve, including rail, it is hard to see this as ‘joined-up’ regulation.

Impact of new technologies

New technologies (including disruptive technologies) have an impact on businesses. Innovate UK is running a number of programmes that fund the integration and adoption of these technologies. One particular research programme is looking into remote piloted systems, delivering our goods in the future. Currently legislation limits movement in this way, but by running trial projects, technology can be verified to see if these are solutions that could work in the future, particularly with last-mile deliveries.

Autonomous functionality

Autonomous functionality is a disruptive technology, which could offer vast opportunity within the transport network. It is a technology that we are familiar with, as it is already in use on rail in the DLR and Underground lines in London. There are many ways in which our road users can start to adopt the technology, with one such approach being for us to start using road trains (or platooning). For these to work in an effective and productive manner, there needs to be industrial collaboration as shown by Scandinavian platooning trials already taking place. Platooning uses vehicle-to-vehicle technology, enabling the lead vehicle to control the

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speed, steering and braking of the vehicles following. Due to the reduction in aerodynamic drag, it is estimated that there could be fuel savings of up to 20% when traveling at motorway speeds\(^{18}\).

Many of the HGV manufacturers have already adopted autonomous functionality, with features that include emergency braking, adaptive cruise control and lane guidance. Manufacturers use different technology to provide the optimum functionality for their vehicles. The technology being integrated gives a vehicle the ability to make decisions, including driving itself and recognising dangerous situations where it will hand back control to the driver. Currently in this area there is little regulation and few common standards on functionality and safety. The free market may decide in the long run, but evidence suggests that it will do so through wasteful duplication and costly market segmentation.

Within rail freight, autonomous developments are visible in terms of wagon design. The technology used within self-discharging systems (automatic loading/unloading) adds benefits to the end-customers where there is good access to the start/end-points. However, to make the most of these systems, there needs to be a distribution system to allow the transfer from the rail arrival point to the user destination.

Is segregation an option?

On any mixed traffic railway, the interaction of trains with different maximum speeds and different rates of acceleration and braking, consumes track capacity. Where this is the case, freight trains are often put into passing loops on key sections of track or at stations, so reducing their average speed. This problem does not of course exist on dedicated freight lines, for example the mineral traffic lines in Australia and elsewhere. In the USA, freight traffic is dominant and it is passenger trains that have sub-optimal schedules. In North America, significant rail productivity improvement has been built on the ability to double-stack containers in very long trains of about 300 containers each. Some have argued that dedicated high-productivity freight routes deserve greater consideration\(^{19}\). The best example of a newly built dedicated freight line in Northern Europe is the Betuweroute, which links the railways of North Germany with the Port of Rotterdam. This has provided improved capacity and reliability for freight and passenger trains in the Netherlands. Traffic density has changed the economics of rail electrification in the last decade, and an inter-modal freight strategy needs to consider the impact of future growth on the case for further dedicated rail routes.

In Britain, some lines closed in previous decades have been re-opened for passenger traffic, the most recent example being the Borders line in Scotland. Studies have examined the case for re-opening sections of the former Great Central mainline as a dedicated North-South freight route in England, but subsequently it was found that new high-speed infrastructure will provide greater benefits and a stronger business case. HS2 will free up capacity for freight and other traffic on the West Coast, Midland and East Coast mainlines. It is not yet clear whether there will ever be a case for re-opening other closed trunk routes in England, such as between Manchester and Derby, or re-opening additional routes between Manchester and Sheffield.

Some others in the logistics sector are now developing rail freight services that integrate seamlessly with passenger services. 5PL (UK) Ltd, for example, is making use of marginal space on passenger trains, and turning stations into cross-docking points between trains and vehicles to provide same-day/overnight, door-to-door services.


\(^{19}\) Kriem, Youssef. Productivity of the US Freight Rail industry: A review of the past and prospects for the future. s.l.: Massachusetts Institute of Technology.
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It is doubtful that history will judge as wise some of the decisions made to close rail lines in the 20th century, and turn them into tourist trails while shifting heavy goods traffic by road through population centres. The connection to Northfleet Quarry (Tarmac) was closed in the 1990s when costing the customer £40,000 per annum to maintain, for no traffic, and re-instated at a cost of £13.7m in 2010 for the Crossrail spoil. These are the kinds of decision that indicate the need for future-proofed planning. Similarly, if platooning is to be adopted on our motorways, a dedicated lane may well be required, with interface issues that need to be managed at driver level with a common national approach.

Getting the right metrics

A sound strategy must be underpinned by analysis based on robust metrics. Comparable methodology would enable us to measure the impact of the way we moved goods by tonnage, by distance, by volume and value. These metrics would need to include analysis of the societal impacts, which would include all external costs, including environmental and economic costs. This would help us to compare transport modes, with an aim to look at how we can maximise our existing capacity and make sure we join up investment opportunities.

The Institution recognises that much of this data will be considered commercially sensitive and needs careful treatment in a competitive market. Suggestions as to topics for analysis include:

- Long-distance haulage assessing the loads moved during what hours and how this impacts on the congestion of network, as well as the fuel efficiency of the vehicles and the emissions that it produced
- Last-mile and first-mile optimisation taking into account the impacts on air quality, noise and congestion
- Optimising route availability, whether on the road or rail network. This will help with the upgrade of infrastructure in terms of cost savings, as well as looking at planned electrification of routes on freight paths, which will enable rail freight operators to start buying electric locomotives
- A detailed analysis of modal choices addressing efficiency and economy. This could provide some real detail into how improvements could be made in terms of reducing CO2 levels and improving air quality
- Efficiency of the network – time that freight vehicles spend sitting in sidings or loops – burning fuel/driver hours
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Paper 3: The Introduction of New Technologies

The UK is globally recognised as an innovator. Businesses should be prepared and have the ability to adopt technologies (some disruptive) that will help them boost their functionality and productivity. The transport and logistics sectors should learn from high-technology sectors, for example automotive, space and defence, embrace new technologies and look at how it can implement them to reap the rewards.

Road

The UK road haulage market accounts for 82% of all freight moved within the UK by tonnage\(^20\). This is achieved by 32,000 enterprises, which in 2013 contributed £9.4bn to the UK economy and generated a turnover of £22.9bn.

One of the key challenges faced by the road haulage sector, is finding alternative energy options to use in vehicles. In 2009 the Automotive Council was established to enhance and strengthen the relationship between the UK Government and the automotive sector. Since its formation there have been a great deal of outputs, including technology roadmaps looking at propulsion solutions for all vehicles across the sector. While diesel is likely to remain the preferred fuel option within haulage for many years, large truck manufacturers are all looking at developing alternative options. Manufacturers such as Scania and Volvo are looking at using compressed natural gas (CNG), liquefied natural gas (LNG) and, ultimately, ultra-low carbon bio-methane for long-haul operations, while others, such as DAF, are developing diesel/battery electric hybrids for urban delivery trucks.

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Alternative energy options

Supporting the cold chain, the company Dearman is developing products that aim to offer a commercially attractive low-emission alternative to diesel. It is in the advanced stage of developing novel auxiliary cold and power units for refrigerated vehicles, buses and other heavy vehicles, along with hybrid-drive systems. Its ‘clean cold’ transport refrigeration unit (TRU) harnesses the expansion of liquid air or liquid nitrogen to deliver both cooling and power, without emissions of \(\text{CO}_2\), \(\text{PM}\) or \(\text{NO}_x\). It can be fitted to conventional refrigerated trucks without redesigning the vehicle or affecting the main engine. However, it also has the capacity to reduce fuel consumption and pollution.

Dearman is focusing upon transport refrigeration initially, because TRUs are largely unregulated and have generally been overlooked in terms of technology development. As a result, a comparatively small TRU can emit far more particulate matter and \(\text{NO}_x\) than a much larger Euro VI propulsion engine. The UK has well-established networks of industrial gases companies, so no new infrastructure is needed. Supermarkets and other end-users are engaging in the technology development process. Operational costs are expected to be less than existing diesel systems. As regulatory and societal pressure on operators to reduce emissions grows, Dearman has the potential to offer technology that can support growth without increasing costs or creating unwanted environmental consequences.

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\(^{20}\) FTA. Logistics Manifesto. s.l.: FTA, 2015.
Reduction of emissions and the adoption of latest technologies is not just the responsibility of vehicle manufacturers. Many of the operators are changing the way they work, for example DHL has launched its ‘Fit for the Future’ campaign. This aims to make the company’s fleet safer, cleaner and quieter, by decreasing vehicle emissions to improve air quality, and reducing the number of accidents through the adoption of new technology. Currently 85% of its fleet meets either the Euro 5 or Euro 6 vehicle emission standards. However, with many local boroughs talking of restricting access for diesel vehicles, more needs to be done to help accelerate the refresh of the current fleet.

Manufacturers are designing alternative vehicles, including expansion to those with the ability to carry 48-50 tonnes. These larger units would suit many customers and amount to fewer vehicles on the roads, so indirectly giving environmental and congestion benefits. Provided the individual axle loads are kept within current legal limits, such higher-capacity vehicles generally spread their loads over more axles than conventional vehicles and consequently are less damaging to roads per tonne of freight transported. In 2012, Government launched its trial of longer semi-trailers, which is providing positive data on the environmental and economic benefits. Current estimates of savings are between 4.2 and 5.2 million vehicle kilometres to the end of 2014. The total trial is expected to save over 3,000 tonnes of CO₂ over ten years, with the overall benefits estimated to be £33m, and all of this within the current infrastructure weight limit21.

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Specific market vehicle development

*Mercedes-Benz Trucks has invested in the development of three different types of vehicle to meet future requirements of its customers:*

- **Long-distance vehicles:** maximising fuel consumption efficiency which has been designed to maximise driver comfort for long driving periods
- **Distribution vehicles:** operate efficiently in mixed urban and rural areas. The cabs are lower in height for easier access and improved direct vision. Some variants are designed with diesel/electric hybrid powertrain systems to store the energy normally lost during decelerating and adopting engine start-stop technology
- **Construction vehicles:** designed to be used for heavy-duty work and make use of off-road ground clearance and improved traction

*Initial sales figures show that there is a challenge to get operators to invest in the distribution of diesel/hybrid vehicles, as they don’t want to pay the additional cost for state-of-the-art technology. Currently there are no incentives to buy these types of vehicle. With these hybrid distribution vehicles, customers want a fast payback, which is just not possible in some cases. Operators are happy to keep their older vehicles for longer, so it requires Government intervention to promote this technology to help drive down emissions and air pollutants.*

Other higher-capacity vehicles, such as European Modular System (EMS) vehicles, are being used increasingly widely throughout Europe and the rest of the world. EMS vehicles are typically 25.25m long and are currently used in Scandinavian countries, in the Netherlands and on a limited trial in Germany. They offer a substantial payload advantage, with a corresponding reduction in fuel consumption per tonne-km of approximately 20% compared with conventional tractor-semi trailer vehicles. High-capacity vehicles are one of the few ways for the road freight sector to make a strong difference to its productivity, fuel consumption, CO₂ emissions and its influence on traffic congestion.

**Rail**

The last 20 years have seen freight volumes grow by 60%, with the rail share increasing from 8.5% to 11.5%²². For many, rail is seen as the green solution, on average a gallon of fuel will move a tonne of goods 246 miles on the railway but only 88 miles on the roads¹. Shifting all our freight onto the rail is not the silver-bullet solution due to the lack of access and capacity available, however, modal shift is part of an optimised solution. For example, reduced movements of coal by rail to outdated power stations creates a capacity opportunity.

Rail freight access charges can be prohibitively high, given road freight’s inherent cost efficiency. Frequency of service and convenient access to the network are key²³. Those who shift construction materials using rail as their transport are expecting to see a 20% increase in payload per train within the next five years. To achieve this, there needs to be development of the rail network and terminals, so that major routes can routinely accommodate trains of 450m length with a 2,000-tonne payload²⁴. This requires improvements in the traction systems, the vehicles and the track.

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²³ FTA. Logistics Manifesto. s.l.: FTA, 2015.
The signalling system of the national rail network is to be progressively fitted with the European Rail Traffic Management System (ERTMS), for which freight locomotives and passenger rolling stock must be fitted with the European Train Control System (ETCS). This is being done to provide a European standard for all such equipment, and to reduce infrastructure maintenance and renewal costs through the removal of line-side signals. Unfortunately, only the future Level 3 ERTMS/ETCS systems will increase capacity. The extent of such benefits has yet to be proven in practice however, especially on densely used mixed-traffic railways. The potential impact on freight traffic requires careful consideration and monitoring when the first British mainlines are fitted.

The UK rail freight fleet is less than 1,000 locomotives, of which approximately half are of a single type (class 66) and use an American two-stroke engine with a long development history. This one class probably moves over 80% or even 90% of rail freight tonnage. These locomotives are approaching half-life refurbishment, which presents an opportunity to re-engine, possibly with multiple smaller engines in line with emerging practice elsewhere. In addition, such new smaller engines comply with current Euro IIIB emissions standards. The limited market for large rail diesel engines is currently limiting development of a suitable engine for diesel freight locomotives, which is further restricted by restrictive UK loading gauge. Upgrading with stop/start technology typical of road vehicles, however, will not happen without some encouragement. Such changes would enable rail to maintain its environmental advantages over road. A further factor which will affect such investment decisions is the extent to which the strategic freight network (and diversionary routes) in Britain is to be electrified over the next ten to 15 years.

**Tarmac**

*The company Tarmac provides the largest amount of construction materials in the UK and spends 10-15% of its total logistics budget on rail freight. As an organisation it estimates that there will be a 25% growth in its use of the rail network to shift its construction materials around the UK. However, a key issue that the company faces is the availability and the quality of the rail paths that are available to it – the average/end-to-end speed at which its rail freight can move is often limited to approximately 25mph, but with some travelling at an average of only 15mph due to the availability of train paths.*

**Air**

Heathrow is the busiest (in terms of number of aircraft movement) two-runway airport in the world. It moved 65% of UK air freight in 2014 and £101bn in terms of the value of goods. This is more than the combined value through Felixstowe (£46bn) and Southampton (£51bn). However, it does not have a rail freight access point. While conventional rail freight may not be well suited to the sorts of cargo moving in and out of Heathrow (low-density goods), there is clear potential to utilise some of the existing passenger rail network and rolling stock for such movements. This is a good example of the current disconnect in UK transport strategy.

Currently 95% of air cargo travels in the belly hold of passenger aircrafts. With a new generation of aircraft there is to be yet more space available for this belly freight payload. Boeing’s 787 generation has 50% greater capacity than the six pallets that fit into a 747. Through just this change Heathrow will grow 25% in terms of freight capacity. These new

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Aircraft are also 20% more fuel-efficient than the models they are replacing and they are quieter, reducing the environmental deficit.

Typically air freight suits goods that are seen as high value, low density, matching the UK’s demand for finished products. In fact 33% of UK long-haul export goods by value travel through Heathrow. Everyday Heathrow receives between 300 and 400 tonnes of perishable goods (about 5% of the total air freight), punnet goods such as strawberries being one example.

Contingency planning is one of the biggest challenges faced by the air freight industry, as there is a lack of resilience in this mode of freight movement. Any disruption requires better co-ordination between the airlines and the airports.

Marine

An International Marine Organisation (IMO) study shows the share of global carbon emissions from international shipping fell from 2.8% to 2.2% between 2007 and 2012. However, the business-as-usual forecast scenarios continue to indicate that those emissions are now set to grow by between 30% and 250% in the period up to 2050, depending on future economic and energy developments.

Currently, shippers have to declare the weight of their containers to ensure they are within the limits of the vessels moving them. However, most freight journeys are limited by the volume rather than weight. DP World (CNS) has invested a large amount into the running of its ports and has improved its efficiency in terms of tonnes of vehicles and the amount of goods moved. This has mainly been achieved by improving ground infrastructure.

Development is needed in our ports, so that they can remain effective as container ships continue to grow in size. An 18,000TEU (Twenty-foot Equivalent Unit) vessel was delivered to Maersk in 2013 and it would not be implausible for 25,000TEU vessels to be sailing by 2035. These would make a very small number of calls at major port hubs in Asia and Europe.

However, the future propulsion systems of these vessels is the biggest unknown. It is expected that developments within a short period will be aiming to reduce their emissions by improving engine efficiency and choosing fuels that emit less CO₂ (one potential option could be LNG, providing that fugitive emissions of methane, itself a potent greenhouse gas, can be controlled). Medium to long-term options include alternative fuels (for example biofuels), fuel cells, batteries and nuclear. However, with many of these longer-term possibilities there may need to be significant technology developments or investments in the infrastructure.

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Paper 4: Environmental Impact

Air-quality pollutants

Air quality is a topic of great public interest, as it affects all of us as well as future generations. Freight currently accounts for about 25% of all external costs of road transport in the EU, in which air-quality costs are a significant factor. In September 2015 the Department for Environment, Food & Rural Affairs (Defra) responded to the UK Supreme Court judgement on the failure to meet EU law on air quality, and it is estimated that road transport is the source of 80% of the NOx in problem areas.

Greenhouse gas emissions

In 2012, 21% of the UK domestic greenhouse gas (GHG) emissions were from transport at 118MtCO2e. Total net domestic emissions from all sources were at 575.4MtCO2e.

Graph 4.1 – UK transport greenhouse gas emissions by mode, 1990-2012 – Department for Transport statistics – Table ENV0201 (TSGB0306)

Within the UK, the Office for Low Emission Vehicles (OLEV) has been effective in supporting the automotive industry in the transition towards and uptake of ultra-low emissions technologies. This has been achieved by providing incentives, as well as representing the UK within European discussions on regulation and legislation. Such a government body has more of a role to play across the transport network in terms of feeding into a national freight strategy. Graph 4.1 gives evidence of this working, as we can see a reduction in the GHG emissions from cars and taxis, where these low-emission vehicles have been adopted.

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However, as is clear from Graph 4.2, there is still a lot more to do, as they still account for over 50% of the emissions from transport within the UK, and the freight contribution has remained steady.

Graph 4.2 – UK domestic transport greenhouse gas emissions, 2012 – Department for Transport statistics – Table ENV0201 (TSGB0306)32

Reducing CO₂ and pollutant emissions is high on the agenda of vehicle manufacturers and logistics companies. However, it involves not only the introduction of cleaner vehicles, but also ensuring that existing fleets are being refreshed so that emissions meet the European Union’s Air Quality Directive targets. The challenge is to link the pollution producers to those who have to deal with the effects. Governments are considering banning particular polluting vehicles from city centres – for example Paris is looking to ban diesel vehicles. Such knee-jerk solutions would clearly be damaging to the freight sector.

Engine design improvements have delivered a 98% reduction in key air-quality pollutant standards since the introduction of European emissions tests, see table below33 (please note these figures are the limits when tested using the ‘Steady-State’ cycle test (as opposed to the ‘transient’ cycle test)). Unlike in the light-duty vehicle sector, the evidence is that these improvements do translate into the real world.

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<table>
<thead>
<tr>
<th>Emission Standard</th>
<th>NO\textsubscript{x} (grams/KWh)</th>
<th>PM (grams/KWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euro I (1993)</td>
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<td>0.36</td>
</tr>
<tr>
<td>Euro II (1996)</td>
<td>7.00</td>
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</tr>
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<td>Euro III (2001)</td>
<td>5.00</td>
<td>0.10</td>
</tr>
<tr>
<td>Euro IV (2006)</td>
<td>3.50</td>
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</tr>
<tr>
<td>Euro V (2009)</td>
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</tr>
<tr>
<td>Euro VI (2013)</td>
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<td>0.01</td>
</tr>
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</table>

In 2014 the European Commission published a strategy for reducing heavy-duty vehicles’ (HDVs) fuel consumption and CO\textsubscript{2} emissions. This stopped short of setting mandatory CO\textsubscript{2} emissions limits for HDVs, opting instead for measures designed to inform the market and allow vehicle-to-vehicle comparability by consumers. Politically, there is a desire to reduce road transport emissions at a European level, and some consider mandatory limits on HGVs and buses are inevitable by 2030.

**Innovate UK Integrated Transport Local Authorities Project highlights the impact of ’Big Data’**


**Local Authority Solutions for Integrated Transport**

In August 2015, Innovate UK announced that four projects are to be funded as a result of successful applications to the Integrated transport local authority solutions competition.

Total available funding for this competition was £9.4m from Innovate UK.

<table>
<thead>
<tr>
<th>Project lead organisation</th>
<th>Project title</th>
<th>Proposed project costs</th>
<th>Proposed project grant</th>
</tr>
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<tbody>
<tr>
<td>Esoterix Systems Ltd</td>
<td>Mobility On-Demand Laboratory Environment (MODLE)</td>
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<td>£1,492,825</td>
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<tr>
<td>Inter Digital Europe Ltd</td>
<td>One Transport: A one M2M-based Open Ecosystem for Nationwide Transport Integration</td>
<td>£3,427,719</td>
<td>£2,408,961</td>
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<tr>
<td>Telefónica UK Ltd</td>
<td>The Smarter Travel Solution</td>
<td>£3,422,385</td>
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<tr>
<td>TravelAI Ltd</td>
<td>CATCH! Citizens at the City’s Heart</td>
<td>£2,046,879</td>
<td>£1,570,791</td>
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</tbody>
</table>
**UK Freight: In for the long haul?**

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**Innovate UK Enhancing the End-to-End Journey**

https://interact.innovateuk.org/-/enhancing-the-end-to-end-journey

An Innovate UK competition, which had investment of up to £10m in collaborative R&D projects to catalyse innovation to improve the efficiency and experience of the end-to-end journey for people and freight. Looking to implement the Government’s Door to Door strategy.

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**Congestion**

The annual cost of congestion to the UK in 2013 was estimated to be £13.1bn and is expected to rise to £21.4bn by 2030\(^{34}\). The Department for Transport recognises that updates to the network are a necessity to meet future demands. Estimates are that traffic volumes will increase by 46% and with a higher increase in average delays of 54% (2003-2035)\(^{35}\).

Fundamental analysis is required to understand the detail and causes of this congestion. This needs to cover the mass of the loads, the hours within which they move, both at origin and destination, and to assess how this impacts on the congestion of network (as well as the fuel efficiency of the vehicles and the emissions that it produced). This will determine where and why there are bottlenecks, to encourage businesses to apply best practice for targeted improvement. By acting strategically we would encourage companies to invest in the UK, due to its proximity and access to European markets, and they would be able to take advantage of the manufacturing facilities and skills we can offer. The national freight strategy would help to identify key strategic freight corridors, which could lead to prioritising of investment across all the modes.

Possible measures that could be introduced to reduce traffic congestion due to road freight operations are\(^{36}\):

- a. Retiming deliveries to occur out of peak hours (as implemented successfully in London during the 2012 Olympics)
- b. Home deliveries, particularly of food, which can take many car trips off the road and replace them with a small number of deliveries by a higher-capacity lorry
- c. Use of urban consolidation centres to consolidate several small deliveries for shops onto a single delivery vehicle
- d. Higher-capacity urban delivery vehicles – for example urban semi-trailers as operated by Boots

Within the UK, rail freight operating companies (FOCs) are dependent on a few key clients carrying a large percentage of their total movement. The drive to tempt additional customers who have not typically moved their freight by rail, is inhibited by the lack of available access points. This could be addressed by working with companies that no longer require all their rail access points, for example Tata Steel. Given the right incentives, such capacity could be shared with distribution organisations that are hungry for rail access. Collaborative use of scarce resources is an obvious prize.

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\(^{36}\) Royal Academy of Engineering. The transport congestion challenge getting the most out of the UK’s road and rail networks. November 2015.
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**Tata Steel Strip Products**

*Tata Steel has been working to maximise the tonnage moved by rail out of its sites to an intermediary point or to port or an end-customer. Since 2000, Tata Steel’s freight distribution mode was 60:40 in favour of road. However, significant investment in infrastructure and offsite warehousing developments has led it to switch this to 80:20 in favour of rail. If rail becomes more cost-effective and appropriate infrastructure is in place, it would mean that Tata could start to look at trans-shipment facilities closer to customers, enabling it to get even more of the bulk haul off the road and offering a better service to customers.*

**Corporate Responsibility**

*When working within the power industry of the UK, companies are more than likely going to be exposed to opposition by local residents to proposals for new developments. Drax has made it a prime objective of its corporate responsibility to make sure that the company works to engage with the local communities. This includes getting deliveries from its logistics providers to follow specific designated routes, and if its drivers don’t adhere to this they are penalised and struck off. It enforces a policy that all vehicles contracted directly to deliver bulk fuels into the Drax site adhere to Euro V/VI standards. By taking this corporate approach, Drax is seen and valued within the local community and recognised as being a key contributor to the local economy.*

**Climate change**

*It is estimated that for every tonne of freight transported by rail, it produces about 80% less CO₂ than that same amount moved by road. Each year, rail freight is currently estimated to save about 1 million tonnes of CO₂ by taking the place of about 7 million HGV journeys and saving 1.6 billion HGV kilometres in the UK*. However, even if we manage to achieve a 50% additional shift from our roads to railways by 2030 (to the equivalent of 2.4 billion vehicle kilometres), this will deliver only about a 0.5% reduction in the whole transport sector’s emissions.

The current market price of commodities does not reflect their true environmental cost. This will change as global resources become more stretched and the environment more stressed, pushing up prices on food, energy and rare metals*. Customers such as Drax already add a specific clause into their road haulage contracts to drive the adoption of the best practice in terms of environmental standards. However, this does not guarantee the same demand flows down through the supply chain into ancillary contracts. By adopting a national freight strategy, Government could further incentivise take-up of technology that would help reduce pollution, future proofing air quality and greenhouse gas emissions.*

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Paper 5: The Skills Challenge

The transport and storage sector currently employs about 8% of the UK workforce, but it is estimated to need approximately 1.2 million additional workers by 2022 to meet growing demands\(^{39}\).

The ageing workforce

Stakeholders are concerned about the impact of an ageing, male-dominated workforce. Some of these older employees are reluctant to be retrained or reskilled in new technologies, whereas younger counterparts are often excited and enthused by the challenges.

Freight traction and rolling stock (T&RS) is a relatively small part of the total national rail fleet, but its maintenance could nevertheless suffer from future skills shortages. This factor is a microcosm of the national shortage in engineering skills which is already occurring in the UK, and is forecast to become more severe unless urgent action is taken to deliver growth in the workforce of mechanical and electrical engineers and technicians who design, construct, develop and maintain Britain’s T&RS fleets. Recent analysis by the National Skills Academy for Rail (NSAR) has calculated that currently this specific section of the workforce numbers some 14,500 people. A combination of the growth in rail investment and the rising number of existing staff retiring, means that more than 8,000 new engineering staff must be recruited and trained to undertake these tasks over the next ten years, equivalent to 55% of the present total.

The Department for Transport, the Department for Business, Innovation & Skills, NSAR and industry partner Siemens have jointly created the new National Training Academy for Rail (NTAR). Located at Northampton, NTAR (opened in October 2015) is a multi-million-pound state-of-the-art flagship for railway engineering skills development. It remains to be seen to what extent the FOCs will take advantage of this new facility, for the training of apprentices, technicians and engineers.

Within the UK we face a demographic challenge in the age of our road haulage drivers, as more than 60% are over 45 years old. Even though technology has reduced the need for heavy lifting and slightly reduced the male gender bias, appropriate facilities are often outdated and off-putting\(^{40}\). Skills for Logistics and the Chartered Institute for Logistics and Transport (CILT) predict that there will be a need for 150,000 new drivers by 2020.

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\(^{40}\) Skills for Logistics. A looming driver shortage? The evidence behind the concerns. s.l.: Skills for Logistics, 2012.
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Knowledge sharing

The logistics sector is one that requires its staff to have a good customer service ethos. This means that they need to have a high standard of soft skills to provide a good service throughout the process. This is something that is not automatically taught in today’s education system.

Stakeholders report a dearth of individuals with good route knowledge of our transport networks. Nevertheless, many found that providing this added to the attraction of in-house training to recruits.

Encouraging employers to take on apprentices to learn from experienced staff is one way that knowledge can be shared. Getting a flow through of employees who have an understanding of maintenance has been highlighted as a weak area across different modes of transport and for all types of vehicle. Government’s recent commitment to encourage the creation of a total of 30,000 apprenticeships in the transport sector by 2020 is a positive initiative.

Need for long-term strategic planning – will help deliver the right skills

Government should develop a long-term cross-party national freight strategy to enable industry to plan and design the right workforce for the future. This long-term vision will enable engineering companies to provide the right skills to be developed for those who will be delivering technological improvements.

An example can come from our rail network, where we need to have confidence in Network Rail’s ability to manage the long-term investment into major project portfolios such as the electrification, signalling and implementation of ERTMS. The UK has a lack of signalling and electrification engineers, due to the lack of investment in these areas over previous decades. This is a significant short-term problem, and its solution will require confidence on the part of the supply chain that previous cycles of investment ‘feast and famine’ will not be repeated.

Attracting the right people and retaining the best skilled

One of the common themes from the stakeholder meetings was that there is a concerted effort already being made by companies to give back to the local communities. Companies realise that they need to make their organisations look like an attractive option to the local community, so that people want to go and work for them. By Government committing to large
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infrastructure projects such as Crossrail, it receives a larger amount of media attention. As the project is being run and managed by Transport for London, it has received positive publicity due to the organisation’s positive reputation on corporate social responsibility issues and TfL’s equality and diversity policies. This can help demonstrate that such projects can provide good career prospects with training for new recruits.

Technology adoption

While there are some good examples, the impression given by the sector is one where the adoption of available technology in tracking, administration and logistics management has been slow. The usual barriers are at work, with training investment held back through demographic factors described above, and business growth driving staff shortages and restricting their release for training.

EU SUSTRAIL Project [http://www.sustrail.eu](http://www.sustrail.eu)

This is an EU-funded project across 14 countries with 31 participants, which ran from 2011 to 2015 with the aim of “designing the freight vehicle-track system for higher delivered tonnage with improved availability at reduced cost”.

The rise of the Engineering Technician

The freight sector must recognise that the industry will outstrip what the market can provide (in terms of skills). We need to ensure that we support our national training academies to make sure the flow through the pipeline is maintained.

The transport sector in the UK has a relatively poor record of training a sufficient number of apprentices and in managing the professional development of technicians. This is where the Engineering Technician (EngTech) accreditation can add a platform for differentiation. Those who are highly skilled technical apprentices (as in the rail sector) are often overlooked in terms of development opportunities, due to the lack of continued professional development available. There is a similar issue with the challenges faced by the Society of Operations Engineers’ Members (SOE) engaged in the road infrastructure business.
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University Technical Colleges (UTCs) have been described as “one of the Government’s best kept secrets” of the last five years. The 70 UTCs in England will create a cadre of 30,000 STEM-based 14 to 18-year-olds attending them at any one time. Those who are now finishing at these UTCs are often not choosing to go to university, because they are being offered very good jobs in industry; often from companies that work as partners with the UTCs, which offer a mix of project work, internships, placements and mentoring. Many then take an opportunity to study later for a degree while working with the employer.

Finally, for Higher Education, the UK is attracting international skills with UK universities attracting a high proportion of foreign students. Retaining them to meet the UK skills gap remains a challenge impacted by migration policies.

Fortunately, the Department for Transport has recognised the skills shortage issue in rail and now through its franchising programmes is seeking stronger commitments from TOCs in training and development. Devolution demands a similar response from regional governments, recognising the need for investment in STEM skill sets.

SOE irtec scheme

Information can be found here: http://www.soe.org.uk/irtec-licensing-scheme/what-isirtec/

What is irtec?
Independent technician accreditation

irtec is a renewable and voluntary accreditation scheme that assesses the safety and competence of technicians who maintain and repair vehicles in the commercial vehicle, trailer and passenger-carrying industries.

Technicians who take the irtec assessment are assessed on their theoretical and practical skills and, if successful, are awarded an irtec licence.