1. Foreword

A 30-year vision for our railways

The railway industry faces uncertain times ahead. Over the past 25 years, we have seen UK railways double the number of passengers it transports, freight increase by 80%, a strong safety record maintained, and a sector which has become a major economic contributor, delivering £36 billion a year in economic value (GVA) and supporting 600,000 jobs.

Yet, whilst our rail industry is a success story, with massively increased usage on essentially the same size network, it faces challenges ahead. This comes as we seek to maintain and upgrade one of the most intensively-used yet oldest networks in Europe, during a period of considerable political uncertainty, including Brexit.

In 2018, the railways came under the spotlight for the Spring timetable changes when many did not experience the rail service they should have, and subsequently, the call for change has grown. What is clear is that the railway industry must become more customer-focused. Both Keith Williams, Chair of the Independent Rail Review, and Network Rail Chief Executive, Andrew Haines, have set out the need for a greater focus on the customer experience. This message applies as much to the rail supply community as it does to operators, or any other part of the industry. As the organisations that build, maintain and enhance our rail system, RIA and its members must ensure we constantly have the end-user in mind, not just the client organisations that procure goods and services. Simply, the customer is our client too.

Similarly, policy makers and decision-holders must see a healthy and sustainable rail supply chain as being intrinsically linked to delivering benefits to the customer. This means thinking long-term, planning and building a supply sector that has a consistent and visible profile of work which comes to market in a stable fashion. We recommend the Government continues with the Rail Sector Deal to support delivery of our ambitions.

2. Introduction

In rail, as with many other infrastructure sectors, a long-term strategy is vital due to the long timeframes of rail improvements. Whether in renewals, major projects, rolling stock, enhancements or electrification, rail businesses need to be able to understand the Government’s long-term priorities for the rail system, in order for these companies to build up capabilities and expertise so that they are able to deliver. A lack of visibility and uncertainty about future work is often cited by RIA members as a key impediment to effective delivery.

Why RAIL 2050?

This document provides a response to growing political uncertainty and the changing landscape for the rail industry. The Williams Rail Review, the nationalisation vs privatisation debate, Government calls to decarbonise and digitalise, a turbulent political situation and Brexit - all these issues will lead to changes in the industry, no matter what your opinion on them. Growing a sustainable rail industry in uncertain times will be essential.

RAIL 2050 sets out the steps required to develop a world-class rail network over the next thirty years - amidst this uncertainty - for the benefit of passengers, freight users and UK plc. The policy certainty that a thirty-year strategy provides can ensure rail businesses have the confidence to invest in people, plant and processes in order to deliver future schemes. The benefits these businesses receive from a long-term strategy can be passed onto end-users.

It combines a number of ‘key asks’ from RIA members and the wider supply chain, in order for the industry to deliver even more for the UK. RIA has previously campaigned on many of the recommendations, or has developed prior work on, but together they offer a vision of what the rail supply community can offer – to passengers and freight users, Government, the economy and other rail organisations.

RAIL 2050 focuses on the key areas of long-term planning, investment, rolling stock, decarbonisation, digitalisation, major projects & collaboration and exports. This list is by no means exhaustive but highlights key areas where the rail supply industry could deliver even more, with the right policy framework. Under these criteria we provide eight recommendations and key asks under each recommendation. For each recommendation, there is also an ‘outcome statement’ providing a description of what we can deliver if the recommendations are delivered.

Next steps

RAIL 2050 is RIA’s flagship policy document. Whether in response to the Williams Rail Review, a General Election, changes in political leadership or changes to industry structure, this document provides a guide to what must be considered on behalf of the rail supply industry. We will continue to make the case for a sustainable rail industry, and a rail system that excels for passengers, freight and the economy, to government, clients, politicians and stakeholders, as we move forward.
3. Our Vision for 2050

A rail system that excels for passengers, freight and the economy

Passengers will enjoy a more reliable and affordable everyday experience and their confidence in rail will have been restored and enhanced.

The UK rail industry will have delivered successfully a 30-year investment strategy, including Crossrail, HS2, East West Rail, Trans Pennine Route Upgrade, Northern Powerhouse Rail, Midlands Rail Hub, Crossrail 2 and enhancements of existing networks to improve performance, capacity, customer experience and reduce carbon.

Rail suppliers will provide world leading products and services. They will implement solutions at home and abroad that minimise the environmental impacts, whilst seeking to double the number of rail journeys on 2019 levels, along with significant growth in rail freight traffic.

We expect the share of UK rail exports as a percentage of UK railway revenues to increase to 40-55 per cent, surpassing other European nations.

RIA is calling for the following, so that by 2050 the UK rail system excels for passengers, freight and the economy and is supported by a sustainable and dynamic supply chain.

- Development of a long term, 30-year strategy that promotes private investment.
- 30% COST REDUCTION
- The smoothing of ‘boom and bust’ in rail infrastructure and rolling stock investment, and improvement to the visibility of upcoming enhancement upgrade projects.
- A better balance in the train fleet between new and upgraded trains.
- Decarbonisation of the railway, through a rolling programme of electrification for intensively used lines and by using battery, hydrogen, bimode and trimode technology for other lines;
- Digitalisation of the railway through deployment of modern digital signalling technology.
- Government to work with the rail industry to set priorities for innovation and collaboration between rail organisations.
- Government to consider the role of the rail industry as a key UK exporter, when developing new trade agreements.

Commitment to major rail projects including HS2, TransPennine Route Upgrade, Northern Powerhouse Rail, East West Rail, Midlands Rail Hub and Crossrail 2, amongst others.
4. A Long-Term Strategy

Rail is vital for the UK economy. Not only does it get us from A to B, but it supports jobs across the country.

The 2018 report from Oxford Economics shows that the UK rail sector contributes annually over £36 billion Gross Value Added (GVA) to the UK economy, employs 600,000 people and generates £11 billion in tax revenues.1

The UK railway network is an enduring asset. More and more people are using our rail system than ever before, with network utilisation about 60% higher than the EU average. We are also seeing more and more people on our railways, with passenger numbers doubling over the past 20 years. Demand is set to double again over the next 20 years.2

Over the next 30 years passenger journeys are expected to double, requiring a long-term view of future rail services. UK rail: a long-term strategy for rail will ensure both industry and Government are ready to meet these challenges, as well as giving confidence to customers that there is a long-term view of future rail services.

Private investment

The Hansard Review, commissioned in 2017, looked at ‘contestability’ in the UK rail market, with the aim of encouraging more private sector investment in, and delivery of, rail infrastructure projects. RIA would encourage the Government to take this work forward, to consider even more ambitious opportunities to work with the private sector, such as through its Market Led Proposals Initiative, and to bring their expertise and innovation directly into the financing and delivering of railway projects.

In doing so, it is important to address issues such as output focused specifications, whole life costing, increased collaboration, alignment of objectives and risk sharing; the key will be allowing the private sector to make some returns on their investment.

Policy uncertainty is one of the major risk factors that currently hampers private infrastructure investment. This is partly attributable to insufficient long-term planning, which has made it difficult to build a broad political consensus on contentious projects and resulted in delays in infrastructure provision. The benefits that a long term strategy would deliver, alongside the existing funding arrangements, include greater investment in people, plant and processes that improve productivity. This would also unlock the possibility of private investment and innovation.

The private sector is willing to invest, across a number of asset classes (especially Digital Railway technologies and rolling stock), in enhancements and renewals, provided the Government permit them to make a return. Under current policies and structures, that is practically impossible. Securing more private finance requires:

- A collaborative approach to risk sharing;
- That the revenue stream from a project is sufficient to secure private financing;
- A whole life costing approach to procurement is used; and
- A streamlined five stage business case model for infrastructure, which is costly for business with process taking several years before an investment receives final approval.

The Government should bolster ready-to-finance projects in the National Infrastructure Pipeline so as to attract more private investors, whilst speeding up the approval process for Market Led Proposals. Private investors are especially interested in ready-to-finance infrastructure projects as the initial stages of projects – scoping, planning and consents – which can involve large additional risks. Between 2013 and 2014, the share of infrastructure projects having reached the stage of ‘Consents Approved’ that is before the construction stage declined from 15% to less than 5%; those in the ‘Planning and Consents’ stage were stable at around 10%.5 The insufficient involvement of long-term equity investors is not due to shortage of private capital.4

To make rail infrastructure projects more attractive to private finance requires:

- Provide a pipeline and a programme approach – for financial institutions to invest in skills and resources to provide finance and risk capital to rail infrastructure projects; and
- A whole-life approach to design.

Policy certainty for our rail network will reduce a major risk factor that currently hampers private investment. Insufficient long-term planning has made it difficult to build broad political consensus on major projects and resulted in delays and cost increases. Unlocking more private investment means more can be delivered with less recourse to the public purse. Ultimately, it can ensure our rail network gets more improvements.
5. Investment

Ensuring investment is delivered consistently and visibly is essential for effective delivery.

A long-term plan creates economic growth and provides a bedrock of confidence for the rail supply chain to invest. The UK rail industry successfully delivers a huge amount of work day-in, day-out to keep the country running and is working hard to manage an ageing rail system that has more and more passengers and freight using it every day.

To continue to do this, the rail network needs sustained long-term investment in maintenance, renewals and enhancements to ensure assets perform efficiently and to ensure suppliers do not see large peaks in work, followed by sharp falls. Our research has shown how detrimental ‘boom and bust’ funding is for the UK rail network, impacting the ability of businesses to recruit and retain staff, reducing investment in innovation and technology and threatening the survival of specialist SMEs who are an integral part of the supply chain. It is also extremely inefficient – adding, we believe, somewhere between 10% and 30% to costs. This is self-evidently a sub-optimal approach way to run the railway both for the supply chain and for passengers.

The ultimate customer – passengers and freight users – want and need more capacity, more reliability, more comfort and more environmentally-friendly trains. Introducing new trains requires long term investment; this should include a mix of new trains and upgrading of existing trains in use on the rail network. Such an approach will help to attract longer term capital, sustain skills and the supply chain itself and is more cost effective in the long run with the flexibility to adopt emerging technologies.

Rail supply businesses want long term pipeline visibility across all major clients, such as Network Rail, Transport for London and HS2, as well as from sub-national transport bodies like Transport for the North, Transport for Wales and Midlands Connect. Transport Scotland published its enhancements pipeline for CP6 in March 2018 giving the supply chain early sight of its plans. The Welsh Government published its vision for rail in Wales in July 2018, which was developed with stakeholders’ overarching visions and a set of objectives for rail enhancements.

A pipeline of metro and rapid transit systems across the UK would enhance this visibility. This will enable businesses to prepare for projects and incentivise investment in skills, innovation and plant. It would also deliver value for money for passengers. Indeed, the future success of the rail sector and customer services, will be heavily reliant on this investment, as will overall UK economic prosperity.

Mainline rail infrastructure procurement is driven by the Department for Transport (DfT), e.g. the Control Period (CP) system and by franchising. The way in which infrastructure work has come to market has led to an artificial ‘boom and bust’ cycle being created. See Chart 1 opposite.

Categories of rail funding:

- **Operations** includes the funding required for Network Rail to run the network;
- **Maintenance**, where existing parts of the railway are looked after to extend their life, includes funding for regular inspections;
- **Renewals** includes replacing pieces of infrastructure with new equivalent parts, when they will no longer respond to maintenance and need to be replaced in whole or part;
- **Enhancements** includes large scale projects delivery new infrastructure such as building a new track for additional capacity.

‘Boom & bust’ - renewals

Companies involved in the provision of UK rail infrastructure know all too well the issue of ‘boom and bust’ in their workloads. As shown in Chart 1 above, in every Control Period since rail was privatised, rail suppliers have seen a ‘boom and bust’ profile in the way work comes to market, often requiring them to increase their capacity at the start of the funding period, only to reduce it when they see a sharp drop-off in workload near the end. It would be more far more efficient to smooth the pipeline of work across each Control Period.

Whilst five year Control Periods are better than annual budgeting, they are not perfect. The system could be improved through better planning and delivery of work. A sharper understanding of the different skills and people that are required at different stages of a project lifecycle would improve matters. There is a risk to effective delivery, otherwise, for example, if all design work started in year one of a Control Period, all earthworks in year two, and so on, the prevalence of ‘boom and bust’ would worsen. So more effective planning for design and delivery across Control Periods is essential, such as design work for the next Control Period starting in the last years of the preceding one.

There is intense scrutiny of programmes of work once let with significant programme management of deliverables. It is less clear of the level of programme management of the procurement timetables with suppliers often experiencing significant delays in the procurement process.

Encouragingly, the UK Parliamentary Transport Select Committee recommended, in summer 2018, that the Government work with RIA and others to identify ways to smooth out ‘boom and bust’. By September 2018, DfT had accepted the recommendation in full.

Since then, we have been working with the DfT, the Office of Road and Rail (ORR) and with Network Rail to identify a practical way forward. RIA’s suggested approach is for there to be a baseline level of work each year, with associated funding, that would act as a floor in the market and keep the network running in a steady state. This would facilitate a continual cycle of design, tender and procurement across Control Periods to avoid a hiatus in work towards the end of one Control Period and the start of the next. This baseline level of funding can then be increased when the Government and the rail regulator determine the final total investment for the individual Control Period. We are discussing this and other options.

The Rail Sector Deal, launched in December 2018, includes a Sustainable Industry Pillar, one of the outcome of which is the provision of a visible, long term pipeline to enable the supply chain to invest in skills and training, innovation, plant and machinery with confidence. RIA is the delivery organisation for the Sustainable Industry Pillar.
'Boom & bust' - rolling stock

It is not only in infrastructure where this problem occurs – if anything the incidence of 'boom and bust' in the rolling stock sector is even starker, as exemplified by the chart below showing the profile of passenger rolling stock orders.

'Boom and bust' creates difficulties for suppliers whether there is a trough or a peak in orders, as seen since 2012. The quantum of orders for new trains and the associated delivery timescales can impact the reliability of new trains more than it might otherwise. Thus 'boom and bust' has a ripple effect between the extremes.

Rolling stock companies (ROSCOs), with their willingness and ability to fund long term assets, make it possible for train operating companies (TOCs) and the Government to provide better services to passengers without needing to fund the capital. ROSCOs, TOCs and Government together need to deliver a better proposition for passengers and value for money, along with long term value in the procurement of rolling stock. Traditional ROSCOs / asset managers knit the system together. They properly manage assets and have expertise. If rolling stock is not managed and utilised through its life, costs will rise for passengers and taxpayers.

The current operating model is different to the immediate post privatisation era: trains are long term assets, whereas franchises are short-term and thinly capitalised. A balanced use of new and existing or upgraded rolling stock will maximise asset utilisation and return on investment. Trains must be fit for purpose and need regular repurposing and upgrades to remain relevant. This can only happen with a sustainable supply chain.

The current increasing trend towards the use of new trains, means that by the end of 2019 there will be a cliff edge in the train refurbishment market – the refurbishment supply chain will need to adapt to survive, as suppliers are critical to keeping trains reliable. A long term, stable pipeline of rolling stock orders must include a plan for skills, such as those needed for the upgrading of existing trains. There will need to be consideration of those skills needed to support performance and reliability of new trains, for example software engineering and data analytics.

Enhancements

'Enhancements' (major projects delivering new infrastructure) include improvements to the railway, such as building a new track for additional capacity. Although the reasons for separating enhancements from the Control Period process are understood, this in itself creates uncertainty in the rail investment programme, because suppliers will have less visibility over the type and scale of enhancement projects that Network Rail may be proposing, and which will be announced later.

RIA also recognises why, in future, enhancements will need to satisfy the Government’s Five Stage Gate approval process, as set out in the March 2018 Rail Network Enhancements Pipeline (RNEP), meaning the Government would not want to commit to specific enhancements until a clear business case exists for them. The RNEP is intended to include only those enhancement projects funded either wholly or in part by the DfT. To be comprehensive, it should also include those projects brought forward by private funders.

DfT has very recently (16 October 2019) published its enhancements pipeline, which it intends to update annually. This indicative programme of enhancements, alongside Network Rail’s Enhancements Delivery Programme, will give the supply chain more visibility of what projects it needs to plan for in the future so that it can invest in skills and capability as well as in innovation and equipment. Delivery of some enhancements extend beyond a single Control Period and this needs to be reflected in how they are treated by the Government going forward. Railway suppliers need consistency and certainty of approach.

The same is true for rail market-led proposals (from the private sector) and we believe there is a general lack of transparency around the market-led process – for example, it is understood that a number of schemes have passed the initial first tranche vetting process, but there has been no obvious formal announcement to date of how many and which schemes have been successful. It would clearly be helpful to suppliers to know this. RIA’s concern is that it will take some while for such schemes to come to market.

Renewals and enhancements require different skillsets to deliver. Renewals are traditionally single discipline schemes, such as track, signalling etc, whereas enhancement schemes tend to be larger multi-disciplinary projects requiring more in the way of specialist system integration and project management skills. The risk is that if there is, as we fear, a hiatus in enhancements in the early years of CP6, then some of that expensive resource will be diverted to rail clients other than Network Rail, other sectors or indeed overseas. And as and when the enhancements portfolio regains momentum, it may be difficult and expensive to recover those resources.

Devolution

It is vital that long term investment plans for rail are developed not just by the UK Government, but also by the devolved administrations and nations. RIA, through Northern Rail Industry Leaders (NRIL) - a group of around 40 rail businesses in the North of England - has developed a report titled ‘Building the North’s New Railways’, which considers how the rail supply industry can support rail investment plans in the North. NRIL is working proactively to help Transport for the North (TfN) develop its programme of rail investment and providing a forum for TfN to engage with rail suppliers.

Similar groups could be developed around the country to match client bodies, and RIA is currently looking to establish a similar group in Wales.

**Orders placed for mainline passenger rolling stock**

- **TOTAL VEHICLES**: 3877
- **2000**: 500
- **1500**: 12
- **1000**: 17
- **500**: 21
- **100**: 168
- **50**: 265
- **10**: 320
- **5**: 120
- **1**: 112

RIAL 2050: RIA’S MANIFESTO FOR A LONG TERM, SUSTAINABLE RAILWAY

November 2019

**Recommendation 2**: The smoothing of ‘boom and bust’ in rail infrastructure and rolling stock investment, and improvement to the visibility of upcoming enhancement upgrade projects.

**Key Asks:**

- A visible, stable, long term pipeline of infrastructure work, encompassing all major client bodies, both for renewals and enhancements, with work coming to market in a smooth profile that minimises peaks and troughs in order books.
- An annual baseline volume of renewals work along with the associated funding. The baseline volume (or floor in the market), determined by asset condition, will represent the minimum level of work and funding needed to keep the railway operating in a steady state. This does not preclude the determination of a higher level of public investment above the baseline level, which would serve as the ceiling in the market.
- A visible national pipeline of enhancements which is developed with early supply chain involvement to ensure innovation and value for money.

**Outcome:**

Consistency in rail investment gives the rail supply chain the confidence to invest in skills, machinery, skills and training and innovation, all of which will ultimately mean better services for passengers and freight users.

It will enable capacity building and the capability to deliver multi-annual work programmes. A smooth pipeline will also enable the industry to sustain and develop skilled teams and thus improve productivity to deliver more with the Government investment it receives. It will also minimise the impact of ‘boom and bust’ in rail investment funding between the end of one control period and the start of the next, during which time work has historically dried up only to ramp up again creating inefficiencies and the loss of key skills, both of which add unnecessary cost to the industry.
6. Train Fleet

Over 7,200 new build vehicles are currently on order in the UK, representing half of the country’s fleet.

Many of these new build vehicles will replace life-ended vehicles which will subsequently be scrapped, but others will displace quality rolling stock with significant remaining life. Opportunities to cascade these existing vehicles to other areas of the network are becoming limited. This unprecedented increase in rolling stock has been driven by Government policy on one hand, and by favourable macroeconomic factors, such as low interest rates, on the other. It has also adversely impacted the rolling stock refurbishment market, which is set to take a severe dip after 2019, with consequent negative implications for the rolling stock refurbishment supply chain.

Rolling stock is designed with an asset life of around 30-35 years, which is longer than the length of any franchise or management contract. A system that recognises the asset life of rolling stock is needed – this is a role for the DfT or a new strategic body, set up after the Williams Rail Review.

Refurbishment or upgrades ensure that existing rolling stock remains attractive and competitive, thereby facilitating a reduction in whole life operating costs, avoiding wasted carbon and encouraging the adoption of innovative technologies and solutions. Recent franchise policy has, however, had a detrimental impact on the rolling stock refurbishment supply chain, as there is a trend towards the increasing purchase of new trains. This is partly an unintended consequence of DfT’s franchising policy being skewed around quality criteria that drive new build solutions, and partly the result of the relatively low cost of finance. Franchise specifications are too prescriptive rather than outcome focused.

The best value for passengers is provided by a functioning rolling stock market which ensures a combination of new and existing assets are deployed on the network. A network which maximises the use of new trains and deployment of existing fleets will give the supply chain the confidence to continue to invest in new assets, but also in maintaining and improving existing fleets. A financially sustainable system is one that gives consideration to a long-term plan that avoids the ‘boom and bust’ of recent times. There are currently three train manufacturing sites in the UK, with three more potential sites all of which will need regular orders to remain sustainable. This compares to one site a few years ago. There is a risk that in the future, the quantum of new train orders will not support all these sites.

Recommendation 3: A better balance in the train fleet between new and upgraded trains.

Key Asks:
- A long term, stable pipeline for new rolling stock orders, which balances the use of new and upgraded trains currently in service on the rail network, in order to maximise the utilisation of a long term asset.
- A review of the franchising regime as it relates to quality criteria, such as whether the average age of the fleet is the most appropriate measure of passenger experience.

Outcome:
A balancing of the train fleet to utilise both new and refurbished trains will support the sustainability of UK based suppliers active in the rolling stock market: from rolling stock operating companies to OEMs and onwards to small and medium sized rail businesses.

This supports the Government’s ambition to decarbonise rail by avoiding wasted carbon from replacing mid-life fleets.

7. Decarbonisation

The Government has set the industry a challenge to decarbonise the rail network by 2040.

Around 40% of the UK rail network is electrified - much less than comparable European countries which are typically 60% or more electrified. The programme announced in 2009 and curtailed in July 2017 originally included a further 850 miles, but this will now be significantly reduced.

Electrified railways on intensively used lines:
- Are better for the environment with carbon emissions 60% lower than those from diesel trains today and 80% less with the estimated 2040 grid mix;
- Produce no air pollutants at the point of use;
- Are quieter, reducing noise pollution for those living and working near the tracks and reduces noise and vibration for passengers;
- Cost less in the long term when compared to the whole-life costs of diesel services;8
- Improve journey times and increase capacity due to superior braking and acceleration;
- Are lighter, meaning less wear to the track and therefore less maintenance;
- Reduce passenger delays, as electric trains are more reliable than diesel trains.

The Rail Industry Decarbonisation Taskforce Report also makes it clear that, whilst new technology has a significant role to play, only electric and diesel traction can deliver the full range of requirements including high speed, long distance passenger and freight haulage. Therefore, as the railway moves towards decarbonisation and conventional diesel traction becomes increasingly unacceptable, further electrification should be considered wherever there is a good business case to do so.

The RIA Electrification Cost Challenge Report demonstrates that electrification can be, and is being, delivered for between 33%-50% of the costs of some recent problem projects’ such as the Great Western Electrification Programme, using examples from around the UK and internationally. The report recommends electrification is endorsed as the first choice in a hierarchy of options for decarbonising the rail network and proposes a minimum 10 year rolling programme of electrification to progressively lower the long-term operating costs of the railway and to support investment in people, process and plant.

The Government has publicly committed to working with RIA to produce a report on cost-effective electrification by September 2019.1 On 28 June 2018, the UK Parliamentary Transport Select Committee made the following recommendation, as part of its Inquiry into ‘Rail infrastructure Investment’: ‘Electrification should be delivered through a long-term rolling programme, in which the Department, Network Rail and the wider industry learn the lessons of earlier schemes and strive to reduce the costs. The Department and Network Rail should engage with the Railway Industry Association’s Electrification Cost Challenge initiative, and together produce a report on cost effective electricity within 12 months.’ (Paragraph 45). On 19 September 2018, the Government responded: “We will continue to engage with the industry and RIA on initiatives that could reduce the cost of enhancing the railway and improve the outcomes for its users. We will work with RIA to produce a report as recommended and will revert to the Committee on the most appropriate timetable to deliver a meaningful report.”

RIA believes that, given the ambition to decarbonise the railway, there is a great opportunity to reduce the long-term costs of the network by combining the best of new and proven technology. However continuous electrification will not be the answer everywhere. In simple terms, RIA believes that the future rail passenger network...
can be considered in three categories:

1. The core electrified network, where traffic is most intense and there is therefore a business case to electrify;
2. The parts of the network for which, due to lower traffic levels and/or long distances, there is unlikely to be a business case for continuous electrification and where consequently new technology low-carbon self-powered trains and the relevant refuelling/recharging infrastructure will need to be developed; and
3. The parts of the network between so-called Category 1 and 2, which can be served, in the medium term, by bi-mode trains which draw power from the Overhead Line Electrification (OLE) but are self-powered ‘off the wires’ currently by diesel but increasingly for longer duty cycles by other zero carbon technologies.

The Rail Industry Decarbonisation Taskforce Report examines the economics and provides a technology route map to decarbonise. RIA believes that this presents the opportunity to progressively lower the long-term operating costs of the railway through a rolling programme of electrification which progressively expands the ‘frontier’ of Category 1 parts of the network, supports route improvements for customer benefit and gradually reduces the proportion of Category 3 routes.

The introduction of zero-carbon train fleets offers the opportunity for UK based suppliers to create a world leading position in this new technology and contribute to carbon reduction and air quality targets.

Category 1 – electrification of the intensively used parts of the network

RIA recommends a rolling programme sufficient to keep two to three delivery teams consistently in action each delivering 75-100 single track kilometres (stkm) per annum, for at least 10 years, across the UK which would maintain a core capability in design and delivery and support a culture of continuous improvement. This would be expected to further reduce the current costs towards European norms. Chart 3 illustrates the electrification volumes over the last 50 years in the UK which has clearly experienced ‘boom and bust’ and in Germany where a rolling programme, by retaining learning and skills and incentivising investment, is able to deliver at significantly lower cost than the best costs currently achieved in the UK. RIA welcomes the Scottish Government’s support for this approach with their strategy to continue a rolling programme of electrification in order to decarbonise by 2035.

Category 2 – development of zero carbon self-powered passenger trains

The 2018 Rolling Stock Strategy identifies there are currently c.3300 diesel self-powered trains in operation and predicts under its medium growth strategy that the requirement for self-powered trains will be around this number out to 2040 (this does not consider the possibility of additional electrification). Of this number, decisions need to be made on replacement of c.1500 within the next few years and almost all within 10-12 years.

This creates an opportunity to introduce new zero-carbon technology in volume within five years as existing fleets come due for replacement. For duty cycles up to 100mph and ranges of 800 miles, Hydrogen Fuel Cells appear to be the most promising technology.

The operating characteristics and refuelling requirements of any alternative technology is an essential consideration. The fact that the technology works does not automatically mean that it will be able to support the existing timetable and any necessary changes may impact on the outputs that the railway is able to deliver. We set out below our view of the approach to each category.

Category 3 – development of bi-mode passenger trains

For high speed, long distance InterCity-type trains, electrification is the optimum solution. However either to serve distant destinations with through journeys or as a transition during a rolling programme of electrification bi-mode trains are a good interim solution. Current ‘InterCity’ bi-mode trains use diesel power when ‘off the wires’. Despite the claims of some commentators it is not feasible to replace the diesel power packs with either batteries or hydrogen fuel cells and maintain the same performance due to the volume requirements of these alternative technologies.

For bi-mode multiple units battery power is probably the most relevant option, although self-powered range is likely to be limited and so this approach is best suited to ‘short hops’ or short branch lines ‘off the wires’. There are however suppliers developing lineside quick re-charging technology which creates other opportunities.

Outcomes:

- Fleet orders for up to 1500 Hydrogen Fuel Cell Multiple Units would stimulate a market and position the UK as a market leader. We already see a number of rail suppliers and leasing companies developing technology demonstrators which reduces the risk of adoption and these demonstrators include ‘upcycling’ existing vehicles. To realise the greatest impact for UK plc it would be appropriate to reconcile UK value added in tender assessment criteria. RIA does not believe there is a need for further research as some suggest but, on the contrary, believes the market is ready to respond confidently to a fleet order.

Key Asks:

- A rolling programme of electrification in the short term (next 1-2 years) with all intensively used lines fully electrified within the following 10-15 years.
- In the next three years, tender the first passenger fleet orders for zero carbon trains, leveraging the experience from the demonstrators now being trialed.
- Provide an R&D programme with a strategy to reduce the carbon impact of rail freight.

As is the case with Heavy Goods Vehicles, there is currently no readily available alternative zero carbon technology to replace diesel in freight locomotives. For rail the challenge is more acute given the energy needed to move a 2500-ton freight train. There are options to reduce carbon including multi-engine locomotives and bi-mode locomotives, although the latter currently have reduced performance when operating in diesel. There is scope for R&D collaboration with the automotive industry on alternative fuels for ‘thermal’ engines, but the space requirements for batteries or hydrogen fuel cells preclude these technologies providing the same performance as diesel.
8. Digitalisation

Digital technology provides the opportunity to improve rail performance and capacity whilst reducing costs.

There are huge opportunities in the use of data and digital technology to improve customer service. However, we will concentrate here on the control (signalling) and command (traffic management) systems which offer significant opportunity to improve the service the railway provides to passengers.

Railway administrations around the world are at a tipping point on digitalisation. There is a good business case for adopting this new technology which is now proven on multiple projects. In reality, the alternative of continuing with conventional technology is the equivalent of choosing a landline over a smart phone. Indeed, in the UK a recent study has identified that digital technology is the only affordable way to deal with the backlog of signalling renewals.

There is the opportunity in the UK to deliver passenger benefits and address both asset and supply chain sustainability challenges through delivering on the proposition in the Rail Sector Deal. This identifies the win-win opportunity to use forward visibility of a pipeline to allow the supply chain to invest in the people, plant and processes which will reduce unit costs.

This forward pipeline visibility will be provided, in large part, by Network Rail’s Long Term Deployment Plan (LTPD) for the rollout of digital signalling. This makes it clear that ‘do nothing’ is not an option in respect of the railway’s signalling systems. Much of the current system becomes life expired in the next 15 years and, if not replaced, would necessitate the removal of parts of the railway from service.

Investment in Digital Railway will improve reliability and thus performance, safety with the inclusion of automatic train protection and, in some cases, will improve capacity. However the benefits do not end there. Once there is a significant roll out of Digital Railway technologies, signallers will know the location of trains with much greater precision and confidence which unlocks the possibility of using this technology to reduce risks to user worked level crossing users and to railway staff, with the possibility of secure ways to protect staff working on the line.

As with every other industry, the move to a digitally controlled and monitored infrastructure and operations offers considerable scope to improve the performance and capacity of the network in and of itself. As a by-product, the data created from such a digital infrastructure offers a further set of opportunities to manage that infrastructure in a new and more efficient way. Much of this benefit positively affects passengers and freight, both directly and indirectly, in reduction of delays.

In a wider context, Digital Railway means not just a digital infrastructure but a digital system, taking in trains and passengers or freight as well. This change will drive better integration of the railway system. Any organisational restructuring of the industry should be done so as to make it fit for a digital future. There are numerous examples of this type of change sweeping through other industries (e.g. Amazon’s online retailing) and also examples of failures to account for this change quickly enough (e.g. high street retailing).

These changes open up the opportunity to change business models and already we see suppliers bringing forward innovations such as the Traffic Management system being implemented on part of the Great Western Main Line where the supplier will be paid by the performance improvements achieved rather than for the capital cost of installation.

Skills

The move to digital technologies will require bringing new skills into the industry and upskilling the current workforce. There is currently a skills gap around Science, Technology, Engineering and Maths (STEM)-related careers, so the Government should work with the industry, and bodies like the National Skills Academy for Rail (NSAR), to ensure the workforce is expanded and ready for the changing work landscape. The development of an incentivised, national and harmonised Skills Initiative would be welcome, particularly looking at how the industry can best utilise current skills assets, like the National Colleges for Advanced Transport and Infrastructure.

Recommendation 5: Digitalisation of the railway through deployment of modern digital signalling technology.

Key Asks:

- Digital signaling technology becomes the default train control and traffic management system to improve the performance and capacity of the railway network. This means designing an organisational structure that supports digital integration to make the rail system fit for the future.
- Digital to be the default option for any new or replacement signaling for all UK railways.
- Delivery of the Long Term Deployment Plan for the Network Rail Digital Railway Programme

Outcome:

The Digital Railway programme is the only viable long term solution to the problem of life expiry of much of the UK signalling asset, it is also the most cost-effective solution to improving the performance and capacity of, and reducing the congestion on, the railway network.

Digital signalling and traffic management will play an important role in improving the passenger experience, accelerating economic growth (including developing high value, highly skilled tech jobs, driving innovation in products and services) and improving environmental outcomes. It will also create a set of exportable capabilities to sell into a growing global market for upgrading legacy systems to digital solutions and for the UK to lead a global transformation of rail transport.
9. Major Projects

Delivery of major projects will be vital in meeting demand for extra capacity over the coming years.

Major projects are large-scale infrastructure projects such as Crossrail, High Speed 2, East-West Rail, TransPennine Route Upgrade, Northern Powerhouse Rail, Midlands Rail Hub and Crossrail 2. They are vital for the enhancement of the UK rail network and for delivering wider economic prosperity - building and maintaining rail infrastructure is critical.

The UK rail industry successfully delivers a huge amount of work, day-in, day-out to keep the country running and is working hard to manage an ageing rail system that has more and more passengers and freight using it every day. To continue to do this, the rail network needs sustained long-term investment in major projects to upgrade and enhance the network and ensure it performs efficiently, delivering value for money for passengers whilst coping with growth. Indeed, the future success of the rail sector will be heavily reliant on this investment, as will overall UK economic prosperity.

Major rail projects can also be economically transformative. For example, East West Rail will transform journeys in one of Europe’s most vibrant economic regions, providing passengers and businesses with a transport system that unlocks economic opportunity and drives forward new housing and jobs.

HS2 will connect some 47 towns and cities across the UK, either through the line-of-route, or through better rail services by taking traffic off existing lines. Crossrail 2 is forecast to grow the UK economy by up to £150 billion. And Northern Powerhouse Rail will increase productivity by up to 2% and bring GVA benefits valued up to £3.4bn per year.

Major rail projects are typically funded by Government or public bodies. They can take several years to complete spanning more than one political cycle. This can sometimes mean that political support for nationally significant projects can change. Starting and subsequently pausing major projects adds cost and reduces delivery efficiency and capability. For example, the skills needed for major projects are multi-disciplinary, given the complex nature of such projects. If projects are paused, higher skilled staff move either to other sectors or overseas and these limited resources are expensive to secure once projects recommence.

We must set major projects up for success from the start. This means the success measures for major projects should shift from an over-focus on costs towards whole-life benefits, such as economic growth, regeneration of communities, improved health and well-being of the population and protection of communities from the effects of extreme weather and climate change.

Recommendation 6: Commitment to major rail projects including HS2, TransPennine Route Upgrade, Northern Powerhouse Rail, East West Rail, Midlands Rail Hub and Crossrail 2, amongst others.

Key Asks:

- Success measure for major projects focus on whole-life economic, social and environmental benefits
- Infrastructure owners complete scope, design and exploration before commencement of work can take place
- Government contracts that reward wider economic impact in tender evaluation criteria. This might include jobs and apprenticeships created, or investment in skills, innovation, equipment or facilities.

Outcome:

A radical increase in capacity, spreading economic growth across the UK, improving connectivity and boosting jobs and investment.

10. Innovation & Collaboration

Innovation and collaboration are key in delivering a modern, dynamic rail system.

Innovation

Innovation in products, processes, technologies and business models support the delivery of a more efficient railway that meets the increasing demands placed upon it. This can, importantly, improve the passenger experience, both in terms of quality and affordability. Therefore, a long-term strategy without innovation is a long-term strategy for decline. The UK railway has a 190-year heritage of leading engineering, driving innovation and employing significant numbers of people in highly-skilled jobs.

The rail industry faces a number of challenges for which innovation will be part of the solution. Government has recognised these issues in the way that they are supporting the automotive industry to innovate towards a zero-carbon future, but there is not yet similar support for digitalising or decarbonising rail. In addition, the rail industry can be highly risk averse and there is no recognised route by which transformational innovations can be progressively developed and introduced whilst managing risk.

RIA believes processes such as the equitable and iterative ‘Innovation Partnership’ Procedure in the Procurement Regulations have a lot to offer here. There is often an expectation that innovation has to be funded and developed by suppliers however these are often SMEs with limited funds to develop significant technologies. Given the ability of the small number of customers to thwart progress, even if unintentionally, and the lack of visibility due to ‘boom and bust’ discussed earlier, it is often very difficult to make the case to invest in innovation.

There have however been a number of recent positive developments; academia and suppliers have created the £92m UK Rail Research and Innovation Network (UKRRIN) which is now expanding to include other industry stakeholders. Meanwhile, Government has continued to invest in innovation in rail through a mix of themed competitions now delivered through Innovate UK. Importantly Network Rail has its own internally managed fund for innovation and R&D, which is very welcome.

These positive developments can be built upon. RIA believes that for innovation, there is a need for clear, stable, strategic policy signals on the challenges that society, railway funders, owners and operators wish to be solved. There also needs to be an environment which stimulates and rewards innovation which addresses these challenges. There also needs to be an objective assessment of the areas where the UK is already, or can become, world class and innovation focused. These may include areas where the UK has academic or industrial capability which has not yet been exploited in rail. For example RIA is currently focusing its innovation activity on the theme of M.A.D.E in Britain where M.A.D.E stands for Materials, Automation, Data and Energy - key areas where the UK could develop a competitive edge.

RIA therefore asks that in the next two years, Government works with RIA, Network Rail and other industry stakeholders to agree the themes for innovation in rail and works to put in place a comprehensive long-term, strategic, co-funded plan to make that innovation happen and be introduced into service.

Collaboration

RIA believes collaboration is crucial to deliver value for money and optimal rail outcomes for both passengers and taxpayers. In many areas, relationships are currently adversarial which jeopardise efficient delivery and innovation. These barriers need to be broken down. Approaches which encourage collaboration must come to the fore, providing customers with a better outcome and allowing the sector to develop with the times instead of lagging behind.
RIA believes that for collaboration to become truly embedded across the sector there has to be a genuine cultural shift. The whole industry, from DfT and others commissioning infrastructure, to contractors and the supply chain, must fully commit to it, adopting a collaborative mind-set and moving to more collaborative behaviours. More than this, it also requires clear and consistent leadership from major clients, large contractors and Government. The potential prize is a stronger, more efficient and more resilient industry working better together to deliver for the customer. RIA has a workshop-based initiative called the Value Improvement Programme (VIP) which raises performance and efficiency through improved culture and behaviours. We have run over 100 workshops with suppliers and Network Rail.

Contractual structures and obligations need to enhance and support a more collaborative working environment by focusing on positive project outcomes and reducing the blame culture, which otherwise tends to dominate more traditional contract structures. Changing and challenging the allocation of risk is also sensible in an environment which requires innovation, participation and cooperation of all core project team members in order to maximise delivery and value.

RIA believes that long term collaborative arrangements with Tier 1 strategic suppliers have a greater opportunity to drive costs down and improve efficiency. In turn, such collaborative arrangements should be extended down the supply chain from Tier 1 suppliers to SMEs. Additionally, we believe that there needs to be greater collaboration between Network Rail, TOCs and suppliers, particularly around the important issue of track access — at present, there tend to be bilateral discussions between Network Rail and the TOCs and between Network Rail and suppliers where we really need tripartite discussions with all three players.

A willingness to encourage rail industry clients to be prepared to devolve management of projects to a core project team would help — even if this means a reduction in control. Actively promoting ‘Early Contractor Involvement’ and ‘Value Engineering techniques’ involving key supply chain members in the core project team will drive both financial and performance benefits. We therefore suggest a greater use of Alliances in order to:

- Improve industry outcomes; and
- Drive positive change across the industry by improving Network Rail and TOC understanding of each other’s business.

### Recommendation 7: Government to work with the rail industry to set priorities for innovation and collaboration between rail organisations.

**Key Asks:**
- Value for money and innovation is incentivised by early supplier involvement and collaborative contracting arrangements.
- Government treats the rail industry similarly to the aerospace and defence industries and commits to an enduring strategic rail supply chain / rail manufacturing capability in the UK. This is recognised in Government procurement policy and innovation funding.
- All major rail clients to use alliance-based approaches to major project delivery.

**Outcome:**
Commitment to an enduring strategic capability in rail will give UK rail supply businesses, UK based original equipment manufacturers (OEMs) and UK based rolling stock companies the confidence to continue to invest in the UK for the longer term.

The greater use of Alliances will help drive positive behavioural change across the rail industry by improving major client and operator understanding of each other’s business.

Government and public sector clients enable more SMEs to take part in the supply chain and increase the percentage of their overall spend (direct and indirect) with SMEs.

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### 11. Exports

The UK is at the forefront of building new, bigger and better rail and enhancing long-established networks.

UK companies have the skills and experience to meet the design, equipment, operational and service needs of existing and future rail systems worldwide. Many companies already provide these services overseas and are significant exporters for the UK. However, more could export. The legacy of our unrivalled expertise in getting more out of existing infrastructure, and building new, operating in a liberalised and closely monitored market and continuously upgrading a live, heavily used rail system provides our exporters with a significant opportunity to demonstrate the use of their products and skills to an overseas audience.

Opening new export markets and expanding established markets will help our experienced and new exporters increase their UK company turnover and help the UK rail industry diversify risk of any slowdowns in the home market. UK company involvement in UK infrastructure projects can act as a catalyst for export activity, helping demonstrate products, services, skills and innovation in current and new projects.

The regulatory framework needs to support and not hinder export growth; indeed, the Government should be providing more support, including financial, to grow exports of UK rail expertise in the design, build, supply and operation of rail networks overseas. Increasing market access for rail and rail products and services through trade deals as a result of Brexit is essential.

The recent Industrial Strategy, Rail Sector Deal is aimed at improving export performance and increasing targeted inward investment. As the UK Industry in partnership with the Government looks to double the number of UK Exporters by 2025 (UK rail exports were worth £800 million in 2018 and supported 7,500 jobs), it is important to remember that continued support from the Government can enable UK companies to become global leaders in both the Digital and Data elements along with other more traditional components of modern railways.

**Recommendation 8: Government to consider the role of the rail industry as a key UK exporter, when developing new trade agreements.**

**Key Asks:**
- In collaboration with Government, create an analysis of overseas rail opportunities for continuing and enabling export growth.
- Sustained Government support for the UK rail industry seeking to enter new overseas rail markets or continuing to export in established markets.
- On-going Ministerial participation in prioritised trade missions and in overseas rail exhibitions to support UK exporters.

**Outcome:**
A greater focus on rail exports will enable UK rail supply businesses to open new markets and expand established markets – by diversifying their operations, UK suppliers can help alleviate the risk of a contraction in the UK market. A pipeline of overseas opportunities will support UK businesses to grow and to will assist SMEs to ‘internationalise’. It will also help UK rail suppliers to attract and retain the skills and expertise to manage their export growth.
12. Recommendations

1. Development of a long term, 30-year strategy that promotes private investment.

2. The smoothing of 'boom and bust' in rail infrastructure and rolling stock investment, and improvement to the visibility of upcoming enhancement upgrade projects.

3. A better balance in the train fleet between new and upgraded trains.

4. Decarbonisation of the railway, through a rolling programme of electrification for intensively used lines and by using battery, hydrogen, bimode and trimode traction for other lines.

5. Digitalisation of the railway through deployment of modern digital signalling technology.

6. Commitment to major rail projects including HS2, TransPennine Route Upgrade, Northern Powerhouse Rail, East West Rail, Midlands Rail Hub and Crossrail 2, amongst others.

7. Government to work with the rail industry to set priorities for innovation and collaboration between rail organisations.

8. Government to consider the role of the rail industry as a key UK exporter, when developing new trade agreements.

13. References

2. Produced by HM Treasury in 2014
3. Improving Infrastructure In The United Kingdom, OECD Paper, 6 July 2015
4. Fig 1 RSSB Research project T1145 ‘Options for traction energy decarbonisation in rail’. Note that, if implemented, advanced diesel hybrids could be 40% more carbon efficient that current diesels.
5. Electric trains are over 35% cheaper to operate than diesels according to the 2009 DfT Rail Electrification Paper. They require less maintenance and have considerably lower energy costs since electricity is a significantly cheaper fuel than diesel. They are lighter and so do less damage to the track. Although there are additional costs involved in maintaining electrification infrastructure, these are significantly outweighed by the train operating cost savings.
6. Decarbonisation Taskforce Interim Report Para 59
7. The Transport Select Committee recommendation and the Government’s response can be found at – https://publications.parliament.uk/pa/cm201719/cmselect/cmtrans/1557/155702.htm
8. For freight trains, there is not currently a viable alternative to diesel for operating ‘off the wires’ and therefore further electrification of core routes and cleaner diesel options are important to reduce the carbon impact of freight operations.
9. Although, as the decarbonisation report notes, “there is no silver bullet to replace diesel for traction”
10. The major challenge with any bi-mode rolling stock is delivering the same performance as an electric train with an on-board power source the mass of which must also be moved. For example, a typical diesel bi-mode has 60% more power available in electric mode compared to diesel mode.

About the Railway Industry Association

RIA is the trade association for UK-based suppliers to the UK and world-wide railways. It has 290+ companies in membership covering all aspects of rolling stock and infrastructure supply and covering a diverse range of products and services. As well as the vast majority of the larger, multi-national companies, 60% of RIA's membership base is comprised of SMEs.

RIA's mission is to provide the best service possible to support the rail supply community to renew and enhance the UK railway, both its infrastructure and rolling stock, and to sell UK excellence overseas to support the dynamic growth both of the UK rail supply industry and the UK's economy. The 2018 report from Oxford Economics shows that the UK rail sector contributes annually over £36 billion Gross Value Added (GVA) to the UK economy, employs 600,000 people and generates £11 billion in tax revenues. It is also a growing industry with the numbers of rail journeys expected to double in the next 25 years along with significant growth in rail freight traffic.