Rail Cluster Builder

Rail Sector Market Insight Report - February 2021

Introduction to the Rail Cluster Project

The Rail Cluster Builder project was awarded to Scottish Engineering in August 2020 and is an 18-month programme funded by Scottish Enterprise and supported by Transport Scotland. The purpose of the project is to facilitate connections for SMEs in the engineering and manufacturing sectors in Scotland seeking to diversify into the rail market or grow their existing business in rail.

The project is jointly funded by Scottish Enterprise and the 2014 – 2020 European Structural and Investment Fund through SPRITE (Scottish Programme for Research, Innovation and Technology Ecosystem). This is a programme which aims to improve the innovation performance of Scotland's Small and Medium Sized Enterprises (SMEs) and stimulate greater coordination between stakeholders and partner organisations to help businesses capitalise on new economic and public sector innovation opportunities.

The roots of the rail cluster project lie in the Rail Services Decarbonisation Plan through which the Scottish Government aims to decarbonise passenger rail services in Scotland by 2035, ahead of the UK's target of 2040. These targets present a real challenge to the industry and its supply chain, requiring a massive uplift in the electrification programme, new efficient train fleets powered by electricity, battery and hydrogen to replace diesel, and innovations and efficiencies to deliver this transformation whilst keep rail transport affordable for taxpayers and users.

This presents real opportunities for Scottish engineering and manufacturing SMEs with the potential creation of new skilled, sustainable employment. The Rail Cluster Builder will support SMEs in establishing their presence in rail and helping to develop Scotland as a leader in the innovation and manufacture of net zero rail products and services.

Decarbonisation of our railways is not the end of the story, but it is the key to unlocking the potential of the future 'world 'class rail transportation network envisaged by Government, offering greater connectivity and accessibility, better service, and faster travel times the length and breadth of the UK, and encouraging modal shift from road and air transport.

Content and purpose of this report

The Rail Cluster Builder technical insight paper published in January 21 explored the role of electrification and alternative traction solutions in decarbonising the rail sector. This market insights report builds on that paper to review the wider programmes of renewal and investment across the UK rail sector with a particular focus on Scotland's Railways.

Section 1 draws on a range of publicly available sources, principally from Transport Scotland, ScotRail and Network Rail, to provide insights into the rail sector in Scotland, including current issues, key market developments and the investment pipeline of major engineering and infrastructure projects. It also provides an overview of how these investments are translating into the capital expenditure and procurement plans of both the major infrastructure owner/manager and the principal operator on Scotland's railway: Network Rail and ScotRail respectively.

Section 2 provides a high-level overview of some of the main infrastructure investment programmes across the wider UK rail sector, including HS2. Given the scale of rail investment plans at UK level and associated opportunities for SMEs this will be the topic of further insights from the Rail Cluster Builder team over the coming months.

This report is intended to provide the rail cluster SME community with high level insights into the rail market and, in particular, an overview of the investment pipeline and the key drivers and themes which underpin the programmes within it. Hopefully it will help build confidence and interest in exploring opportunities in a wide range of developments, which in sum represent the largest national investment in transportation infrastructure and systems across Scotland and the UK in recent history.

Over the coming months the Rail Cluster Builder project team will be supporting SMEs in understanding the sector's requirements, accessing this rapidly growing market and building connections within the supply chain.

1 - Scotland's Railway: Market Insights

1.1 - Overview

A dynamic partnership

The rail industry in Scotland operates through a partnership of Government and rail industry operators working together to deliver safe, reliable and value for money rail services for passenger and business use. The partnership includes the following principle participiants:

- Transport Scotland – The Scottish Government's transport agency
- Network Rail (Scotland's Railway) - The owner, operator and developer of railway infrastructure in Scotland
- ScotRail (Operated by Abellio) - the franchised national train operator for Scotland
- Serco Caledonian Sleeper Ltd and Cross border rail operator – Franchised train operators who also utilise Scottish network
- Office of Rail and Road - The UK Regulation body
- Freight operators
- Rolling Stock Companies – who lease rolling stock to the train operators
- And last but by no means least: **the rail industry supply chain.**

The partnership works within a long-term strategic framework defined by Transport Scotland through the National Transportation Strategy and delivered via 5-year budget and investment periods (Control Periods). The strategy sets out key goals for an accessible, high quality railway at the heart of a decarbonised transport system.

Vital national transport infrastructure

Scotland's Railway provides a vital national transport infrastructure connecting cities, communities and businesses with over 2800 miles of track, 359 stations, and over 2500 daily passenger and freight services, carrying over 300,000 passengers each day.

Prior to the Pandemic in 2020, the use of rail services in Scotland was higher than at any time in the last 150 years with 107m passenger journeys annually according to Network Rail, nearly twice the number compared to just two decades ago. This growth is expected to continue with passenger numbers forecast to more than double on many major routes over the next 3 decades.

The ongoing pandemic crisis has significantly interrupted the growth trend, however, there is broad agreement at the transport policy level that rail has the potential capacity and is best placed to carry large numbers of people to and form urban centres quickly and safely whilst achieving zero carbon goals. That said, the scale of the task cannot be overstated given that just a 10% mode shift from car transport would be expected to double annual rail passenger journeys ie an extra 100 million journeys per annum. The challenge is how to achieve this scale of increase, or even greater, in rail usage whilst not increasing cost to the rail user or the taxpayer.

Pandemic impacts

The serious impact of this crisis has to be a key consideration in reviewing the current rail market in Scotland and across the wider UK. Utilisation of all public transport networks has been significantly impacted, and even with 90% of rail services running since August 2020, and safety protocols in place, there has been a reported drop of around 75% in passenger numbers compared with the same period in 2019. The table above illustrates the decline in passenger journeys as reported by ScotRail for the period March '20 to November '20.

Weekly Passenger Journeys	March	August	November
Commuter	750,000	81,000	105,000
Peak	530,000	150,000	137,000
Off Peak	830,000	350,000	210,000

ScotRail Data: Mar- Nov 20

The implications for the rail industry, in the short term at least, have been stark, with significant loss of fare revenue, which makes up one third of total income. In logistical terms, ScotRail had to revise its service timetable 11 times during 2020. In normal circumstances one major timetable revision would take 12 months to plan and implement. Significant effort has also gone into introducing new cleaning and hygiene regimes for rolling stock and stations. A previous Technical Insights Report from the Cluster Builder Team highlighted the opportunities for innovation in addressing these challenges through, for example, hygiene innovations and digital apps to facilitate social distancing and minimise touch points.

If there are any positives to be reported it would be that lower utilisation of rolling stock as illustrated in the table opposite for ScotRail has allowed asset maintenance and upgrade programmes to be expedited. The move towards digital communications has also been progressed in the efforts to reduce printed materials such as tickets and timetable information.

Annual vehicle miles (m)	2019	2020	2021
Pre-COVID plan	133	138	145
Actual / Forecast	129	102	107

ScotRail Data

With little prospect of a significant easing of lockdown measures any time soon, a short-term recovery appears most unlikely. Recovery of utilisation levels for all transport networks will of course depend largely on personal choice and business needs, and there is considerable uncertainty about how quickly and how far rail

utilisation will recover. According to the Transport Scotland COVID-19 Public Attitudes Survey in December 2020, 46% of respondents say they will avoid public transport and use their cars more, after the pandemic, than they did before. To allow a recovery from Covid-19, and to address climate targets at the same time will require rail to be perceived as safe, to be seen as the transport norm rather than the exception, and to be progressively viewed as the sustainable option.

Despite these very serious current considerations, it is clear that rail remains centre-stage in the Scottish and UK Government's strategic plans for a decarbonised transportation system and that major investments in the sector are proceeding. These are explored further below.

Rail as a key driver for economic growth

According to Transport Scotland, rail is a key growth sector of the Scottish economy, generating £1.3bn per annum. It supports over 13,000 jobs, around 9,000 of those directly, promoting STEM skills and apprenticeships. Network Rail alone employs nearly 3,000 people and engages over 160 suppliers, many of them local SME businesses.

The railway in Scotland receives some of the highest public subsidy levels anywhere in the UK. Two thirds of the costs of operating the system come from the Scottish Government (ie taxpayer), and ticket prices are on average 20% lower than in the rest of the UK.

The strategic focus on rail expansion and decarbonisation will see its contribution to the Scottish economy growing significantly, but that comes with a price and the real challenge is to ensure that these objectives can be achieved as efficiently as possible to avoid significant extra costs to users of the system or to taxpayers.

Decarbonisation

As explored in the Rail Custer Technical Insight paper issued in January, a key investment driver in the rail sector in Scotland is the target set by Government for decarbonisation of passenger rail transport by 2035.

Michael Matheson MSP, Cabinet Secretary for Transport, Infrastructure and Connectivity:

"Transport is a significant contributor of greenhouse gas emissions, but within the transport mix, Scotland's railway is a success story, with around 76% of passenger and 45% of freight journeys already on electric traction. We must build on this success by converting more passenger and freight journeys to this environmentally sustainable mode, a key element of our new National Transport Strategy. Through investment in electrification and complementary traction systems we will decarbonise the traction element of domestic daytime passenger rail journeys in Scotland. It also demonstrates our approach to investment in green technologies and our

commitment to creating a greener, more environmentally just economy with growth in greener, more sustainable sectors."

The aim is to achieve this challenging goal through the following means:

- Primary focus on electrification – investment in quieter, faster, greener electric trains (supported by the transition towards a fully decarbonised electricity generation system)
- Backed up where necessary by new alternative traction technologies, e.g. battery electric and hydrogen powered trains
- Longer sets providing more passenger capacity
- More efficient network management, operation and maintenance using digital technologies

Rail is already well down the path towards decarbonisation – between 2014 and 2019, 325km of Scotland's railway was electrified enabling the introduction of a £370m fleet of 70 modern electric trains. 76% of all Scottish rail passenger and 45% of freight journeys are currently undertaken on electric services and there are plans to electrify most of the network with work already ongoing on the East Kilbride and Barrhead lines. It's not just about passenger services - modal shift from road haulage to rail is key with every freight train removing on average 76 HGVs from the road network.

Railway - decarbonised network in Scotland, 2035

Map showing decarbonised rail network in Scotland, 2035

Electrified network (sections of route may include discontinuous – or intermittent – electrification and the use of battery/electric bi-modes) and the electrification of some freight only lines may be subject to review
Alternative traction - transition solution
Alternative traction - permanent solution

The graphic opposite illustrates Transport Scotland's plans for decarbonisation of the network by 2035, as outlined in the Rail Service Decarbonisation Action Plan. Herein lies the core challenge of zero carbon rail for Scotland - 1800km of track requires to be electrified, 20 feeder stations need to be built, and just under 1000 bridges will potentially need reconstruction or parapet extension to provide clearance for electrification.

This will require a step change in investment compared with the rate of electrification actually delivered in recent years. Interim solutions will be deployed on the route map to 2035, using partial

electrification and battery powered Electric Multiple Units (BEMUs). On lines in the West Highlands and Far North, self-powered hydrogen fuel cell trains are expected to provide the long term solution because full or partial electrification is unlikely to be viable..

Choice and Connectivity

Rail investment is promoting better and faster travel choices and greater connectivity. With 2800 miles of operational track, Scotland now has its longest domestic railway for 100 years. and further extensions are planned. Some of the main developments, recent, current, and planned, are summarized as follows:

- new lines between Airdrie and Bathgate, and between Glasgow Central and Paisley Gilmour St
- return of rail services to south east Scotland after 50 years, with the opening of the Borders Railway
- electrification of a number of existing lines making journeys faster and increasing passenger capacity
- upgrading the Highland mainline and the between line Aberdeen and Inverness
- more than a dozen new railway stations across the country, and extensions/upgrades to many existing stations.

Control Period 6

Since 2007, approximately £8Bn has been invested in Scottish rail infrastructure. Over Control Period 6, Network Rail's investment planning period for 2019 to 2024, a Further. £5Bn will be invested, representing the biggest ever devolved rail budget for Scotland.

Network Rail in Scotland is part of "Scotland's Railway", responsible for overseeing this significant investment, for long-term strategic planning, for asset stewardship, for operational and maintenance activities and for ensuring safety and reliability of the network.

The enhancements planned for completion in Control Period 6 (CP6) will build on the improvements already delivered in CP5 and will include (main source "Our Delivery Plan for 2019-2024, Scotland's Railway):

- increasing service frequency and capacity across Scotland
- embracing new technology and innovation to deliver efficiencies and service enhancement
- further line electrification works and planning (the electrified network expanded by 25 per cent in CP5
- addressing the maintenance requirements of this expanded electrified network
- asset renewal plan focused on enhanced lineside maintenance and targeted replacements to boost reliability and reduce line closures, restrictions and incident recovery times

- improved resilience to extreme weather events.

There will also be a 21% increase in the expenditure on the day to day running of the rail network versus CP5 to deliver improved performance and resilience over time.

1.2 Review of Rail Investment Projects

This section provides an overview of the range of rail investment projects, ongoing and planned, which are being delivered in Scotland during CP6. It also provides insights into some potential future phases of railway development which align with the Scottish Government's strategic objectives for expansion and decarbonisation of the rail sector.

1.2.1. Current Projects

The first priorities for CP6 are very much on the completion of the current range of rail improvement and electrification projects, many of which are close to full commissioning, or moving into new phases of delivery.

Edinburgh Glasgow Improvement Plan (EGIP)

The EGIP programme, which commenced in 2006, is largely complete and has already facilitated the introduction of modern efficient electric rolling stock to Scotland's busiest inter-city passenger route. Commuters, business users, tourists and leisure users have access to improved choice, faster and quieter journeys and lower resultant carbon emissions. The phased programme is delivering / has delivered the following improvements:

- Electrification of the core Edinburgh to Glasgow via Falkirk High Line - 150 kilometres of new electrified railway
- 42 minute fastest journey time between Edinburgh and Glasgow
- Introduction of 8 car electric trains providing more passenger capacity
- Three redeveloped stations: Cumbernauld, Haymarket and Glasgow Queen Street
- One new station: Edinburgh Gateway station with connections to Tram and Fife line services
- Longer platforms, to take longer trains at Linlithgow, Polmont, Falkirk High and Croy
- One new depot for electric trains at Millerhill, east of Edinburgh
- Electrification of the Cumbernauld line and the introduction of electric trains.

New Glasgow Queen Street Station in Construction

Aberdeen to Inverness Improvements

The 108 miles long Aberdeen to Inverness rail ink line was originally mainly single track with passing loops. With passenger journey times of around 2 hours, 25 mins and services only operating every 2 hours, the route did not offer an attractive alternative option to road travel.

The programme of investment is being delivered in phases, with each phase bringing significant incremental improvements. Project completion is scheduled for 2030. The main ambitions of the project are as follows:

- Hourly service between the 2 cities with a 2 hour journey time (end to end)
- Enhanced commuter services into each city
- New stations at Kintore in Aberdeenshire and Dalcross, next to Inverness airport
- Increased opportunities for rail freight.

Phase 1 was completed in 2019, delivering a 59 per cent increase in services each day between Dyce and Aberdeen and a 69 per cent increase between Inverurie and Aberdeen These improvements were facilitated by the delivery of the following major works.

- The redoubling of the track between Aberdeen and Inverurie – laying over 10 miles of new rail.
- £15m Kintore station re-opened after 56 years.
- Signalling enhancements between Nairn and Elgin.
- 19 bridges refurbished or replaced.
- Platform extensions at Insch and Elgin.
- Relocation of Forres station.
- Track loop extension at Forres
- Inverness Airport station (Dalcross) is due to open in 2022.

The scope and timing of future phases of work required to deliver the project aspirations are still to be determined and will be the subject of detailed investment planning.

Highland Main Line Improvements

The Highland Main Line runs from Perth to Inverness facilitating commuter and work travel as well as being one of the main tourist access routes to the Scottish Highlands. A £57m investment programme is improving connectivity between the north of Scotland and the central belt and supporting economic growth for the whole of Scotland.

Phase one of the project was delivered back in December 2012, increasing services from nine to 11 trains per day and reducing journey times by an average of six minutes at a cost of £1.2 million.

Phase Two was completed on 25th March 2019 delivering new infrastructure which will enable the following improvements:

- Operation of an hourly service between Inverness and the Central Belt.
- Reduced journey times.
- Enhanced performance and resilience
- More efficient freight operations.

Other key projects completed in 2019 (CP6 Year 1) were as follows:

- Stirling, Dunblane and Alloa electrification.
- Shotts Line electrification.
- Dunbar station additional platform.

1.2.2. New Projects

A range of new projects across the country have either been commenced or committed to through the CP6 rail funding period. These include:

- 25kV Feeder Stations to support the electrification programme.
- Carstairs Junction Renewal - the single largest renewal in the CP6 plan. Extensive works include 10km of line track renewal and refurbishment of signalling equipment. This will deliver improved line speeds on the main lines and routes between Glasgow and Edinburgh via Carstairs.

- Edinburgh Control System – replacement of obsolete signalling control system.
- Perth re-signalling and rationalisation – replacement of obsolete signalling and control systems.
- East Kilbride and Barrhead projects – line electrification and improved services relieving overcrowding in dense commuter areas south of Glasgow.

- Levenmouth Branch reopening and partial electrification for BEMU replacement of diesel.
- Partial electrification for BEMU operations in Scottish Borders.
- Haymarket to Dalmeny Electrification to support BEMU services to Leven.
- West of Fife improvements including Electrification of Alloa to Longannet.
- More services and faster journeys between major cities, including Perth, Aberdeen and Inverness.
- Renewal and refurbishment works on 900km of track and 256 structures.
- Upgrading of the 10 highest risk user-worked crossings to improve safety

Future phases of the Rolling Programme of Electrification will be developed during CP6 to align with life-expiry of current ScotRail diesel fleets by 2035, and further extensive line electrification works will be assessed for approval and/or commencement during this period including: Highland Line, Aberdeen to the Central Belt, Aberdeen to Inverness, Fife to Perth and Dundee, Fife Circle, Ayrshire and South West, Dunfermline to Longannet.

A range of other related improvement projects are also being evaluated for improving services to rural communities on the West Highland and Far North and Kyle Lines.

1.3 Investing in Stations

Scotland's 359 railway stations provide access to the rail network across the country, from the busiest urban locations to the most remote rural parts of the network, and are a key element of the passenger experience.

ScotRail operates all stations except for Glasgow Prestwick Airport which is owned and operated by the Airport, and Edinburgh Waverley and Glasgow Central which are operated by Network Rail.

Enhancement of existing stations and commissioning of new stations is a fundamental part of the rail investment plan. Recent and planned initiatives in this regard include:

- Modernisation programmes at flagship stations such as Dundee, Glasgow Queen Street, Edinburgh's Waverley and Haymarket, Aberdeen, Perth, Stirling and Motherwell.
- Building more than a dozen new stations across the country. In addition to the new Leven, Cameron Bridge and Kintore stations more new stations are planned on the East Coast Main Line at East Linton and Reston, on the Aberdeen-Inverness line at Dalcross, at Winchburgh on the Glasgow Edinburgh line, and at Clackmannan, Kincardine and Longannet.
- All new stations will be fully accessible and upgrading works will provide step-free access at Anniesland, Croy, Dumfries, Johnstone, Port Glasgow, Uddingston, Aviemore, Pitlochry, Kingussie and Nairn.

Edinburgh Waverley Station: Artist Impression (Network Rail)

Local communities will also benefit from the review of rail properties, through for example low-rent business spaces in formerly disused station buildings.

1.4 Investing in Rolling Stock

The current fleet operating in Scotland includes Hitachi, Alstom, Bombardier (now Alstom) Siemens and original BR/BREL rolling stock. Expanding the railway whist improving reliability, quality of service and reducing carbon emissions will require significant investment in new rolling stock, and nearly £0.5Bn has already been committed by the Scotrail Abellio franchise for new and better trains for the Scottish railway network:

- Last year, ScotRail completed the introduction to passenger services of the 70 strong fleet of Class 385 electric trains, bringing total number of carriages across Scotland's Railway to 1,016.

Hitachi Class 385: ScotRail

- These state-of-the-art Hitachi built Class 385 trains operate on routes across Central Scotland, and the completion of platform extensions at Glasgow Queen Street has enabled the operation of eight-carriage Class 385 Express trains between Glasgow and Edinburgh via Falkirk High.
- ScotRail is also in the process of introducing 26 refurbished high-speed Inter7City (BREL InterCity125) trains to connect Scotland's "seven cities" as part of Abellio's £475million investment in Scotland's Railway. These refurbished trains are already offering up to 40% more passenger capacity on routes which were typically congested at peaks

Refurbished InterCity125: ScotRail

- These125 class still holds the record for the fastest diesel electric locomotive in the world, but will be phased out by the early 2030s and replaced with electric trains.
- 75 new hotel-class Caledonian Sleeper coaches have been introduced on the Lowland and Highland routes from London.

Caledonian Sleeper

These investments will deliver faster journey times, more frequent services on key lines, quieter services and higher passenger capacity with approximate 100,000 more weekday seats. The trains will all be equipped with improved accessibility, more power sockets and better Wi-Fi availability.

The growing fleet of electric trains, supplemented by battery and hydrogen trains in the near future, will require new and extended facilities and infrastructure for maintenance, support and charging / refuelling.

ScotRail's rolling stock is leased from Rolling Stock Companies (ROSCOs) including Eversholt, Porterbrook and Angel Trains. These companies were established back in 1994 at the time of privatisation of British Rail with the purpose of owning and leasing rolling stock to the Franchise operators. The ROSCOs work closely with OEMs, investing and innovating to ensure that the rolling stock can meet the changing requirements and increasing demands of rail operators for safety, reliability, speed, comfort and emissions reductions.

Their strategic imperatives include:

- Delivering early wins through increasing the performance of existing EMUs which form the backbone of the current ScotRail fleet portfolio
- Incremental improvements to efficiency and performance of self-powered fleets
- Replacement of obsolete vehicles with new rolling stock
- Investment in new and augmented traction technologies including hydrogen fuel cell traction (expected to enter commercial operation in the UK over next 2 years) and battery-augmented EMUs
- Investment in other technologies including lightweight materials, digital, smart maintenance etc.

There are currently no rolling stock OEMs located in Scotland (see section below re Talgo proposals) however there are heavy maintenance facilities at Alstom Polmadie, Hitachi Craigentinny, Brodie Engineering Kilmarnock and ScotRail's fleet is maintained at Edinburgh Haymarket, Glasgow Eastfield Shields Road and Corkerhill, Ayr Townhead, Bathgate, Inverness and the new EMU stabling depot at Millerhill in Midlothian.

Looking at the wider GB rail picture, the Rolling Stock Strategy Steering Group published the consolidated views of cross-industry membership in their 6th edition of the Long Term Passenger Rolling Stock Strategy for the Rail Industry (2018). They noted that "the number of new vehicles committed for delivery in the five-year period that commenced in April 2014 (CP5) and in the early years of CP6 is now 7,187 – more than 50% of the current in-service fleet of 14,025.

"These new vehicles have a capital cost of more than £13 billion, and around 50% will be built in Britain. The average age of the national fleet is estimated to fall from 21 years to 15 years by March 2021, while the numbers of vehicles in service will grow by 6% next year and by a further 5% to 13% by 2024.

"The long term rolling stock outlook remains unchanged with a national fleet increase of between 40% (5,500 vehicles) and 85% (12,000 vehicles) forecast over the next 30 years. The mix of traction power amongst these vehicles is uncertain, but with the industry predicting another doubling of demand in the next 30 years and the franchising authorities continuing to invest based on similar expectations, the long term outlook remains positive". (f

"The strategy emphasises the resulting benefits to passengers and the wider community, including improvements to capacity, punctuality, reliability, passenger facilities and the environment."

Scotland to have its first hydrogen-powered train running during COP26

Hydrogen fuel cell powered trains have been identified in the rail decarbonization strategy an alternative low emissions traction type in areas where full electrification may not be possible due to economic or geographical constraints.

In what will be the first step in demonstrating and testing this traction technology in Scotland, a Class 314 EMU (electric multiple-unit) 3 car passenger train will be converted to hydrogen fuel cell electric.

Fuel cell powertrain specialists Arcola Energy and a consortium of industry leaders in hydrogen fuel cell integration, rail engineering and functional safety including Arup, Abbot Risk Consulting and AEGIS, have been appoint by the Scottish Government funded Hydrogen Accelerator to deliver the hydrogen train demonstrator. The project is aimed at developing skills and supply chain in Scotland associated with fuel cell electric technologies. The train will be demonstrated in November 2021, coinciding with the 26th United Nations Climate Change Conference (COP26) which is being hosted in Glasgow.

The output and experiences from the project will be used to assess and inform the case for the roll out of hydrogen fuel cell powered rail in Scotland.

Talgo Longannet

Talgo, a Spanish based international train manufacturing company, has announced the site of the former Longannet Power Station near Kincardine in Fife as its preferred location to build a state-of-the-art manufacturing hub for high speed trains.

Outline planning permission for the redevelopment was granted in December '19. Talgo has been active in building connections with the local Scottish and UK supply chain and it is hoped that the planned facility will be instrumental in creating a local hub of rail supply chain business including high tech manufacturing.

Talgo is currently bidding to supply rolling stock to the UK Government's HS2 project, however, the firm has indicated that the final decision to develop a manufacturing facility at Longannet does not depend on the HS2 deal, and that export opportunities could be supplied from the site.

1.5 Rail Freight Operations

Rail freight plays a significant role in connecting Scotland to Deep Sea and European export / import connections via the main UK ports and also for domestic cargoes within the UK.

Rail carries a wide variety of goods and commodities. Its greatest advantages are for high volume and bulk material such as petroleum, metals, slurry, aggregates and cement. The Food and Drink industry are also major users of rail including the Scottish Whisky industry.

The demise of coal fired power generation at Longannet and Cockenzie over the last 10 years caused a significant decrease in rail freight utilisation in Scotland, given that several million tonnes of coal had previously been delivered to these stations per annum via rail. However, with increasing rail capacity and connectivity, combined with low carbon credentials, there are good prospects for growth in rail freight and the operators are diversifying into new sectors. There are also new innovative services being developed, for example, Inter City Rail Freight's express freight service is integrating capacity on high-speed daily passenger rail services with local couriers to provide "door to door" shipments for time-sensitive discrete deliveries, and an objective for progressive decarbonisation. This service has seen considerable growth with the recent increase in the need for rapid delivery of medical supplies.

Rail freight has a different operating model compared to passenger services with trains running in 'open-access' operations (i.e. not through a franchise contract) but they have stringent controls applied. Network Rail is the owner and operator of Britain's rail infrastructure and the connections to major customers' own private sidings. Many of its sites and depots are leased to freight train operators. Network Rail has responsibility for finding suitable 'paths' (timetable slots) for both freight and passenger services to operate, and is committed to the development of rail freight.

Freight services across the network are provided by private sector Freight Operating Companies (FOCs) The principle FOCs in Scotland are Colas, Direct Rail Services, DB Cargo, Freightliner and GB Railfreight, These are complemented by Third Party Logistics Providers such as Eddie Stobart, JG Russell and Malcolm Logistics. There are rail freight terminals all over Scotland but the major ones would include Mossend, Coatbridge, and Grangemouth, Inverness and Aberdeen.

1.6 Expenditure and Procurement

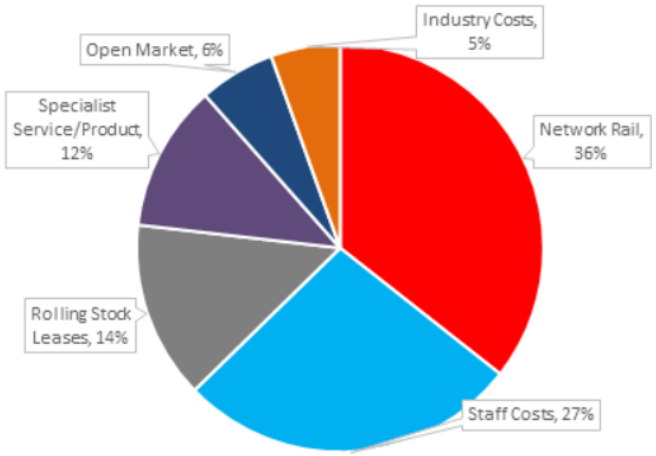
As may be expected for a major mixed public/private regulated industry with cross-charging between multiple entities, total sector expenditure and procurement is not simple to track and present, but it is possible to explore publicly available information from ScotRail and Network Rail (Scotland) who control the vast bulk of the budgets in Scotland.

High level Insights into how much of this spend is accessible to SMEs are also discernible. The expectation is that SME participation in the supply chain will grow and the main asset owners, operators and framework contractors have stated ambitions to facilitate such as they look to address the significant challenges facing the sector whilst bringing economic benefits to local communities across the UK.,

ScotRail

ScotRail has an annual budget of over £900m:

- Network Rail Charges, Staff Costs, Rolling Stock Leases and other Industry Costs account for 82%.
- 12% (£110m) is for Specialist Service such as engineering maintenance – which may be accessible to SME sub-contractors or through appropriate interventions in the procurement process.
- 6% (£57m) is available to be tendered in the open market and SMEs are actively encouraged to take part in these competitions where appropriate. These include services such as CCTV, buildings, PPE provision.



ScotRail Annual Budget 20/21

ScotRail has identified a number of initiatives to encourage and support SME access to their spend and it is hoped that will help increase SME participation in the supply chain:

- Reducing threshold for advertising opportunities on Public Contracts Scotland ("PCS").
- Review of Specification and evaluation procedure.
- Set Weightage in tenders for Social element.
- Look to lot large contracts to allow SMEs to bid on smaller elements.
- Reserve categories for supported businesses/SMEs.
- Streamline documentation
- Identification of supplier/business capacity/pre-procurement engagement.

- Posting advanced tender information on Public Contracts Scotland (PCS).
- Feedback to SMEs on how they can improve.
- Establish SMEs Forum.
- Attendance at "Meet the Buyer" events
- Impose obligation on main contractors to adopt similar SME engagement methods procuring sub-contracts.

Network Rail

Network Rail's total CP6 planned expenditure in Scotland over CP6 (2019 – 2024) is approximately £5bn.

In 2019 Network Rail launched a GB wide action plan to work more efficiently and closely with SMEs, being more transparent to them and cutting red tape and bureaucracy

This "SME Action Plan" seeks to ensure that Network Rail will achieve the Government's target of spending a third of its annual expenditure via SMEs by 2022.

The plan recognises the vital role of SMEs in adapting and innovating to meet industry challenges, in bringing competition and efficiencies to the supply chain and reducing taxpayer burden.

It recognises SMEs' ability to innovate and adapt quickly to industry challenges. The plan focuses on six areas of improvement: engagement, pre-procurement, procurement, contract management, supplier management and innovation.

Network Rail highlight that

- of almost 4000 suppliers they contracted directly with in the 2018/19 financial year, 71% were SMEs.

- 30% of their overall annual expenditure in the same years was with SMEs

R&D

Given the technical and cost challenges facing the rail sector in meeting its transformational objectives, R&D has a critical role to play, whether in infrastructure or in rolling stock.

For CP6, £357m has been set aside for Network Rail at GB level and this resource will be deployed on the following priority issues

- Efficient asset management
- Better passenger experience and operations
- A safer and more secure railway
- A decarbonised railway

This spend will cross a range of technologies including Robotics, Materials, 3D printing, Energy, Autonomous Systems, Digital and Data applications.

Network Rail will work with partners in the supply chain, industry associations, academia, research institutions, and the UK Catapults to deliver tangible and measurable benefits in these areas. 114 projects are already up and running with £75m direct funding and £45m external funding allocated.

Many other industry participants including OEMs, Rolling Stock companies and Franchise rail operators are also investing heavily in R&D.

2 UK Rail

The future of the rail sector across the UK is being shaped by the common strategic objectives and policy goals of decarbonising transport, creating faster, higher quality services and increasing connectivity and accessibility.

There is a strong and consistent policy theme across UK and Devolved Governments that rail is the most cost-effective and practical means to achieve these goals ahead of road or air travel. There is a shared sense that the UK has lagged behind other nations in making the major strategic investment decisions required to underpin and assure rail's long-term role in an integrated transport strategy – and that now is the time to make up lost ground. Anyone who has travelled by rail in other parts of Europe may share that notion.

There is also a shared desire to ensure that local supply chains the length and breadth of the UK are able to access and participate in what will be, when considered in its totality over the next 20 years, the largest investment in rail infrastructure across the UK in recent history.

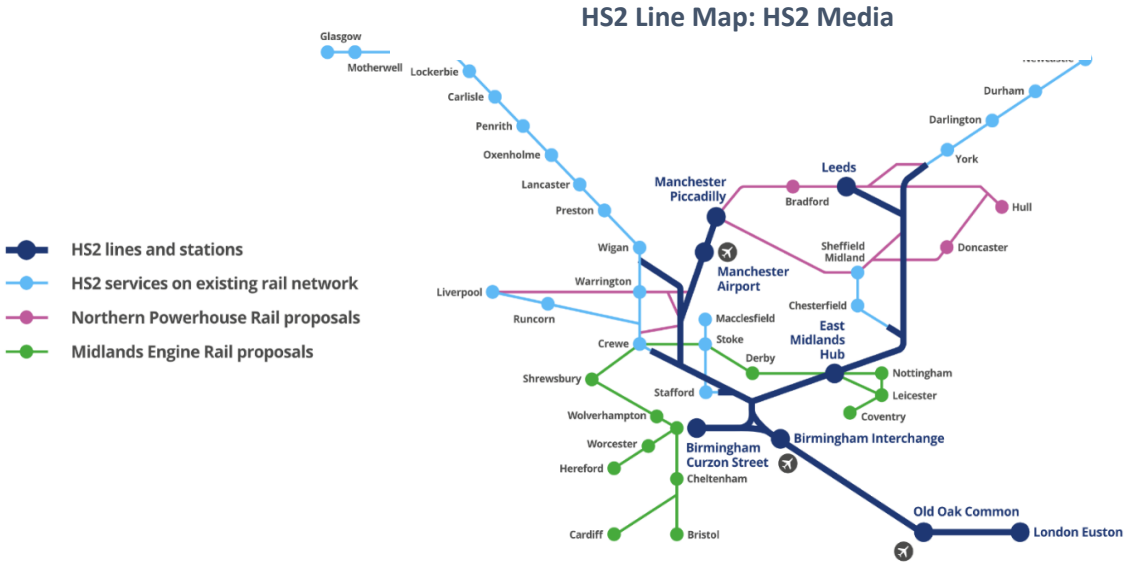
In many ways, the high speed rail programme, HS2, can be considered the UK's flagship rail project. Whilst the new railway lines currently being developed and planned are limited to specific parts of England, HS2 will bring improved services and lower journey times to many population centres across the UK including the Central Belt of Scotland.

2.1 HS2

HS2 is a new high-speed railway linking up London, the Midlands, the North of England and Scotland, serving over 25 stations, including eight of Britain's 10 largest cities and connecting around 30 million people. This massive engineering programme is expected to be complete, under current plans, during 2035/40.

HS2 aims to deliver step change improvements in passenger capacity and rail connectivity whilst supporting Government ambitions for decarbonisation of transport systems. It's the largest infrastructure regeneration project in Britain for decades and is expected to create thousands of jobs in construction and in the UK wide engineering and manufacturing supply chains, including significant opportunities for SMEs.

HS2 Overview



- Over 25 stations including 8 of Britain's 10 largest cities, connecting c.30m people
- New dedicated track moves fast trains off existing networks providing local, slower trains including freight with more Capacity
- Journey times from London Euston to Glasgow Central will be 3hr 38 mins (53 mins less) and to Edinburgh Waverley 3h 39 mins (41 mins less).
- The full HS2 project will deliver 343 miles of track, 45 miles of tunnels, 37 miles of viaducts, 119 miles of cutting, 120 miles of embankment, and employ an estimated 30,000 workers in its development
- For long distance travel, HS2 will emit 17 times less Carbon the equivalent domestic flight and 7 times less than the equivalent car journey
- Around 2000 businesses have already delivered works to HS2, 60% of which are SMEs and 95% based in the UK
- Phase 2a and 2b forms a Y shape extending the network into Eastern and Western routes.

Delivery Phases

HS2 Phase 1 centres around a new railway line between London and Birmingham and is currently under construction. This phase has a funding envelope of £45bn, and is employing a workforce of approximately 16,000. The journey time from London to Birmingham will be reduced from 91 minutes to 49 minutes when the new

line is operational around 2028/31, and journey times from London to Glasgow will be 35 minutes less at 3h 56min.

This phase incorporates:

- 134 miles of new track
- 32 miles of tunnels
- 44 miles of cuttings
- 38 miles of embankments
- 9 miles of viaducts
- 4 new stations
- 2 new depots
- 500 bridges

Phase 2A of the project connecting Fradley (North of Birmingham), to Crewe in Cheshire was given Royal Assent on 11 February 2021. This will involve construction of a further 36 miles of new track, a new station, and will employ a workforce of around 5000 during construction. This Phase will help towns and cities across north western England, north Wales and Scotland benefit from HS2 sooner. HS2 services will join the existing rail network to create direct services to places including Liverpool, Manchester, Preston, Carlisle and Glasgow. This phase is due to open 2029/33 and will reduce the journey time from London to Glasgow by a further 13 minutes (a 48 minutes total reduction) to 3hrs 43 mins.

Phase 2B will create further connections to towns and cities in the North of England and Scotland linking Crewe to Manchester and Birmingham to Leeds. This phase will deliver cumulative reductions in journey times from London to Glasgow and Edinburgh of 53 minutes and 41 minutes respectively when it is completed during 2035/40.

Rolling Stock

There are currently 5 companies in contention to provide rolling stock for HS2:

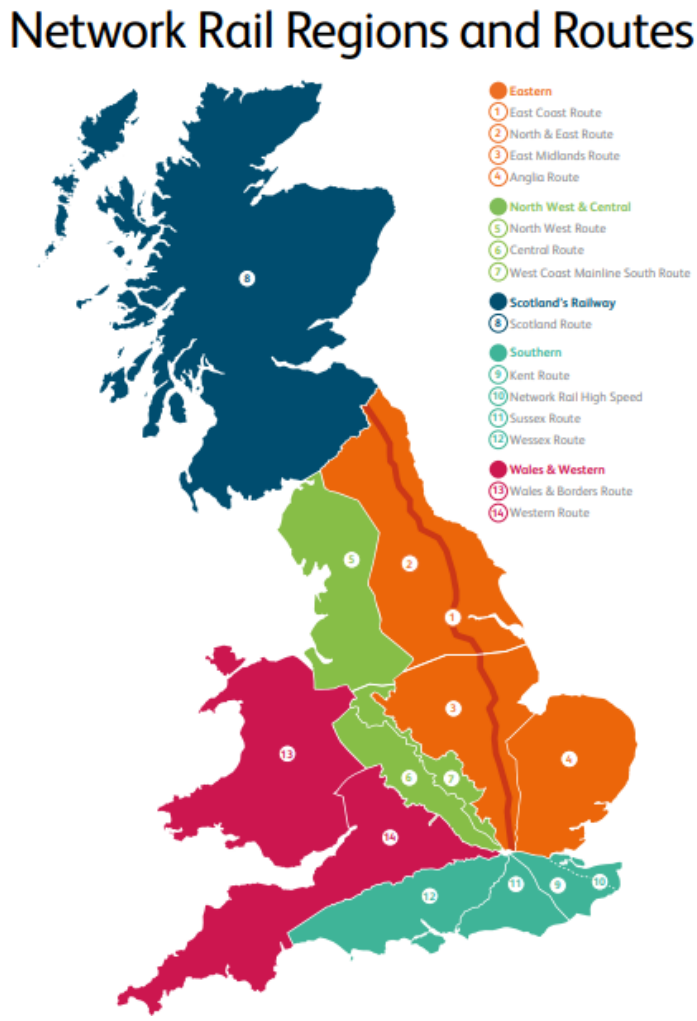
- Alstom – (AGV Family)
- Caf – (Oaris)
- Hitachi / Bombardier – (AT 400)
- Siemens – (Velaro)
- Talgo – (Avri)

The high speed electric trains will travel at speeds of up to 225 mph (360 kph) on the new HS2 line infrastructure and will be supported by new and upgraded stabling facilities including Polmadie in Glasgow.

2.2 Regional Rail Overview: England and Wales

The UK Rail network (excluding Northern Ireland) is split into 5 regional areas and 14 routes as illustrated in the network map below. Scotland forms one region, and England and Wales are covered by 4 separate regions.

Network Rail has already released its plans for Control Period 6, which started on 1 April 2019. These show how the company intends to spend £53 billion over the five years of CP6 (2019-2024), including almost £38bn on maintenance, renewals and enhancements.



As with Scotland's Railway. the plans have been worked up from route and regional levels to accommodate distinctive local requirements, and each region has its own budget plan and specific objectives, within a co-ordinated UK wide framework. The plans focus on making improvements to what matters most to rail passengers and freight users, targeting punctuality and reliability through better assets, timetables and information, and working much more closely with train operating companies.

Network Rail's chief executive Andrew Haines said: "Passengers and freight users are at the heart of our plans over the next five years. Performance has been nowhere near good enough and public trust in our industry has declined. This must change.

"Our role is to deliver a railway that people can rely on, with trains that turn up and arrive at their destination on time, and where passengers have confidence they are in safe hands. This is what we must deliver daily and what we will, and should, be held to account for throughout CP6.

"Our plans for the next five years bring us much closer to train operating companies and local decision makers, they cut red tape and make it easier for others to work with us, and most importantly they put a real focus on the users of the railway."

Network Rail's plans include improving punctuality performance from 85.7 per cent (2018-2019) to 87.5 per cent (2019-2020) and 89.8 per cent (2023-2024) and in future performance is likely to be measured in terms of actual lateness at all stops on the route, not just at the terminus – the measure used to calculate PPM today.

A high level overview of the Network Rail regions of England and Wales and their respective investment plans are as follows (from "Our Delivery Plan for 2019 – 2024"):

2.2.1 Eastern

The Eastern region operates some of the busiest rail lines in the country, transporting large numbers of commuters to and from busy cities including Newcastle, Leeds, Sheffield, Derby, Norwich, Cambridge and London.

Region at a glance:

- More than a billion annual passenger journeys
- 6,042 miles of track in the region
- 3,400 passenger trains per day
- 1,057,462 tonnes of freight moved a week with 1,742 freight movements

Between 2019 and 2024 £13.6bn will be invested in operating improving the railway across Eastern.

2.2.2. North West & Central

The North West & Central (NW&C) region is an economic spine linking the main cities of London, Birmingham, Manchester and Liverpool, and so connecting workers with jobs, people with families and goods to market.

NW&C's three routes – North West, Central and West Coast Mainline South – were launched in September 2019, delivering devolved decision-making closer to the markets served in line with Network Rail's Putting Passengers First (PPF) transformation.

Region at a glance:

- 246m annual passenger journeys
- 6,700 train services per day
- 24% of Britain's railway
- 571 stations

In CP6 demand for rail is forecast to grow dramatically – by 12% for passengers and 18% for freight. This is a particular challenge because in some parts of the region, such as the West Coast Main Line, Europe's busiest mixed-use railway, the network is already completely full.

HS2 has received the Government's green light to proceed, this will add much-needed capacity on the West Coast, freeing up space on congested rail arteries into the Midlands and the North. The Great North Rail Project, including upgrades to the Trans-Pennine route and , longer term, Northern Powerhouse Rail, and Midlands Rail Hub strategy also seek to boost capacity and connectivity, including to the new HS2 railway once complete.
Funding for re maintenance, renewals and operations programme is set at £5.7bn (2018/19 prices)

CP6 projects overview

West Coast Mainline South route (south of Crewe to Euston)

- HS2's purpose is to create more capacity on a full West Coast Main Line. The On-Network Works team are working with HS2 Ltd to integrate the new railway to the existing network.
- East West Rail Phase 2 – new railway between Oxford and Bedford and Milton Keynes and Aylesbury, secured transport and Works Act Order consent in February 2020 and is now working towards final investment

Central route (West Midlands and Chiltern)

- Birmingham resignalling is a major CP6 scheme of similar complexity to London Bridge. During delivery there will be minimum impact to passengers at Birmingham New Street station.
- Midland Rail Hub is Midland Connect's plan to boost regional rail connectivity including to the new HS2 railway.

North West route (Crewe to Gretna)

- Crewe hub - £1bn of remodeling and resignalling to be delivered as part of long-term plans to integrate the existing rail network with HS2.
- Upgrades to the Leeds-Manchester TransPennine route are set to take place in CP6.

2.2.3 Southern

The Southern region comprises Wessex, Sussex and Kent routes, as well as Network Rail High Speed. The region links major towns and cities including Bournemouth, Southampton, Portsmouth, Brighton, Canterbury, Ashford and Dover; and is also critical to London's transport south of the Thames.

Region at a glance:

- 700m annual passenger journeys
- More than 7,000 passenger and freight services operate on the region every weekday – more than a third of Britain's rail services.
- 3,300 miles of track
- 571 stations
- £7bn invested over CP6 in operating, maintaining and renewing the railway.

CP6 projects overview – extending capacity and connectivity

Kent Route:

- Spending £340m on track and junctions, plus completely replacing more that 560 switches and crossings.
- Spending £235m on major signalling renewals at Hither Green and Victoria and will spend £75m on earthworks to protect against landslips.
- £177m will be spent on replacing and refurbishing bridges and tunnels.
- £88m will be spent on station improvements.

Wessex Route:

- Spending £1.3bn on renewals, £598m on maintenance, £441m on operations and support to provide a more reliable and safer railway which is easier to access and has more space for passengers.
- Investing almost £80m on the West of England line to prevent landslips at Crewkerne, Gillingham in Dorset and Honiton.
- Spending £454m upgrading the signalling for Feltham and Wokingham with a state-of the-art system aimed at reducing delays.

2.2.4 Wales & Western

The Wales & Western region brings together Wales & Borders route, Western route and Western & Wales Infrastructure Projects.

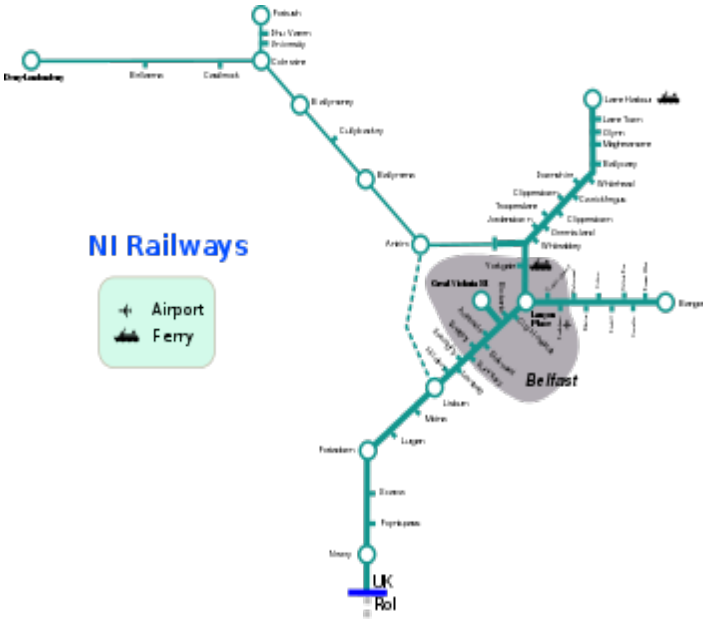
Region at a glance:

- 3,540 passenger trains per day
- More than 20,000 people a day travel by train to Heathrow
- 3,352 miles of track in the region

CP6 projects overview

- Supporting Transport for Wales' £5bn plan to transform rail services, with increased capacity, new rolling stock and improvements to stations across the network.
- Planning a £25m refurbishment of Grade II listed Barmouth Viaduct.
- Investing £176m in refurbishing and replacing track across the network and £27m to meet the challenge of climate change and extreme weather.
- Investing over £40m on the renovation and refurbishment of the heritage roof at Bristol Temple Meads.
- Investing £120m into the upgrade of Bristol East junction.
- Replacing over 700 track circuit systems, part of the signalling system with more reliable axle counter technology, to reduce delays into and out of London Paddington - £50m investment.
- Spending £375m renewing or refurbishing 428km (20%) of track.

2.3 Northern Ireland



Rail services in Northern Ireland are operated by Northern Ireland Railways NIR, which is a subsidiary of The Northern Ireland Transport Holding Company (NIRTHC). Unlike the rest of the UK, rail services in Northern Ireland are not subject to franchising arrangements and remain wholly within the public sector, ultimately controlled by the Northern Ireland Assembly.

NIRTHC has three subsidiaries including Ulsterbus, Metro (previously Citybus) and Northern Ireland Railways, trading jointly as Translink. The group's main objective is to deliver an integrated transport system within and to/from Northern Ireland.

The 205 miles rail network uses 1,600mm gauge which is also common to the republic of Ireland (compared to 1,435mm standard gauge of GB).

Belfast is the hub of the network with 6 main routes connecting to towns across NI including Derry/Londonderry to the north and Newry in the south, where the line continues across the border as part of the Enterprise fast service to Dublin.

As with rail across the rest of the UK, NIR has seem greatly increased passenger numbers over the last 20 years following rolling programs of investments in rail infrastructure, stations and rolling stock. Examples of work over recent years include

- Significant track works including signaling upgrades on the Belfast to Derry / Londonderry and Belfast to Portadown lines.
- 21 new carriages ordered delivering 2,000 more seats.

A new suite of Transport Plans is being prepared which is intended to set out the framework for transport policy and investment decisions up until 2035. This will include further upgrades to rail infrastructure, improved journey times across the network and new rolling stock whilst reducing carbon footprint (NIR currently operates only diesel traction units).

Examples of proposals which are have been identified in media sources as those of potential interest included a new service operating from Belfast International Airport with the re-opening of the closed Lisburn Antrim railway line, and reopening of the line between Armagh and Portadown.

In Decembers 2020, PM Boris Johnston announced that the UK Government were setting up an independent transport review, chaired by Network Rail's Sir Peter Hendy, to consider options for improved road and rail connections across all four home nations. One of the options which will be assessed in terms of cost, practicality and demand will be for a new fixed road or rail link by tunnel or bridge between Great Britain and Northern Ireland, potentially running from Portpatrick in Galloway to Larne in County Antrim. This very tentative proposal has received a somewhat mixed reaction from political and media sources, however, if such an ambitious project were ever to be progressed it would represent another massive transport related infrastructure project for the UK.

Conclusion

This report set out to provide SMEs in the Rail Cluster Builder with helpful insights into key issues, themes and investment plans in the railway sector in Scotland and the wider UK.

From the review, there are some key themes that stand out to the RCB team:

- The future of the UK rail sector is being shaped by the strategic objectives for decarbonising transport, creating faster, higher quality services and increasing connectivity and accessibility.
- Rail is seen as the most cost-effective and practical means to achieve these goals and there is an appetite and willingness in Government and across the sector to make the big and difficult investment decisions to ramp up rail as a natural travel choice for millions more travellers.
- The current Pandemic has been a major setback to rail, as with many other sectors in our economy. While the route to recovery remains unclear as at February 2021, the evidence is that Governments are holding firm to their long term plans for the sector.
- The policy objectives set by ministers may be very challenging in terms of delivery – but they are being acted upon now and are bringing real opportunities for the supply chain.
- Decarbonisation of passenger rail services in Scotland by 2035 sets a particularly challenging target – a railway industry colleague recently commented that in railway investment terms "2035 is next year".
- Huge progress has already been made in this direction, however achieving this objective will require a transformational change in the electrification programme and associated works.
- There is a shared desire to ensure that local supply chains the length and breadth of the UK are able to access these opportunities.
- Innovation and efficiencies across the rail sector will be key to ensure that these plans can be delivered whilst ensuring that rail is affordable for both the travelling public and taxpayers.

- Throughout the sector there will be huge opportunities for SMEs - but no-one underestimates the challenges of “getting into rail”, understanding the sector and developing competitive and innovative products and services.

Hopefully, the insights in this paper will help build confidence and interest in exploring opportunities in the wide range of rail developments, which in sum represent the largest national investment in transportation infrastructure and systems across Scotland and the UK in recent history.

Over the coming months the Rail Cluster Builder project team will be supporting SMEs in accessing this growing market, understanding the sector’s requirements and building connections with the rail supply chain.

Resources

1. Rail Transport Decarbonisation Action Plan, Transport Scotland, 2020

2. Traction Decarbonisation Network Strategy, Network Rail

3. National Transport Strategy Delivery Plan 2020 – 2022

4. Our Delivery Plan for 2019-24, Network Rail, 2019

5. Network Rail Scotland Route Strategic Plan, 2019

6. Network Rail CP6 Delivery Plan Update - Scotland's Railway, 2020

7. Long Term Passenger Rolling Stock Strategy for the Rail Industry (6th Edition 2018) – Rolling Stock Strategy Steering Group

8. Delivering Your Goods: Benefits of using Rail Freight, Transport Scotland, 2016

9. Network Rail SME Action Plan, 2019

10. Scotland Route Strategic Plan, Network Rail, 2019

11. Transport Scotland Website / Media

12. ScotRail Website / Media

13. Network Rail Website / Media

14. HS2 Website / Media

15. Translink Website / Media