Written evidence submitted by Rock Rail Holdings Ltd.

Executive Summary

- Rock welcomes the reopening of the Transport Select Committee's Inquiry into Trains fit for the future and the opportunity to submit this written evidence. Should the opportunity arise, Rock would be delighted to provide oral evidence if that would be of interest to the Committee.
- The overall global contribution to CO_2 emissions by rail travel is already comparatively low, and therefore the true benefit of rail decarbonisation is through modal shift of passenger journeys from road and air travel to rail. The UK's future rail delivery strategy, following the completion of the Williams review, should incentivise long term private investment into decarbonisation projects that encompasses the entire rail system, including both infrastructure development and the upgrade or renewal of rolling stock.
- Rock does not believe further financial support is required from Government. Global rolling stock manufacturers are already capable of delivering the technology required to decarbonise the rail system. But Rock considers that a commercial framework, based on the delivery of passenger benefits and increasing passenger demand, which balances risk and reward for investors is required to accelerate the delivery of decarbonisation projects.
- Rock's fleets are made up exclusively of electric and bi-mode trains. Our long-term roadmap includes the progressive transition from diesel to alternatively fuelled power sources, and eventually through to full electric operation as electrification progresses from partial electrification through discontinuous electrification to full electrification. These transitions should be considered as part of a joined-up industry strategy, looking at the whole rail system, to ensure benefits are realised as quickly as possible in advance of the full requirement for the removal of diesel-only trains by 2040 and for "net zero" greenhouse gas emissions by 2050.

1. Introduction to Rock Rail

1.1 Rock Rail Holdings Ltd (Rock) is an independent developer, investor and asset manager of passenger focussed rolling stock and other rail infrastructure. Established in 2014, it has pioneered a new approach to rolling stock funding, leading the way in partnering with major institutional investors. This has opened a significant new source of highly competitive, long-term funding for the rail industry, helping reverse the aging profile of the UK national fleet and contributing to a significant reduction in rolling stock leasing costs.

1.2 Since February 2016 Rock has secured £3 billion of institutional investment in over 1,500 new, state-of-the-art rolling stock vehicles for service across five current UK franchises. Accounting for c40% of UK passenger rolling stock orders over the period, these modern, technology-enabled vehicles are already delivering better journeys for passengers, better value for the taxpayer and supporting more sustainable travel.

1.3 Rock's investment decisions are underpinned by consideration of environmental, social and governance factors and Rock is committed to delivering responsible investment with sustainable benefits for the environment, local communities and wider society. This strongly aligns with our institutional investors who have at their core a requirement for responsible ESG based investment.

1.4 Together with our investor partners, Rock takes a long-term view to investments and from the outset considers a "whole system approach", with consideration of future passenger needs

and how track and train integrate over the full life of the trains to deliver passenger focussed, sustainable rolling stock and rail infrastructure.

1.5 Our modern fleets are already contributing to a more sustainable railway: for example, in its first year of full service, Rock's Electric Multiple Unit (EMU) fleet running on the Great Northern route has already generated 17 million KWh through its modern regenerative braking system, saving the equivalent of over 4,000 tonnes of CO_2 emissions and helping make it 33% more efficient than the trains it replaces[1]. Our fleets are exclusively made up of electric and bi-mode trains and are set to replace many hundreds of diesel vehicles, helping reduce CO_2 and other particulate emissions as well as delivering significant energy efficiencies versus the many old and life expired vehicles they replace.

1.6 As brand-new trains, they are designed to be "future fit": all our trains are ETCS ready, able to take advantage of latest digital technology as it is integrated into the infrastructure. The modular design of our electric-diesel bi-mode fleets, means they will contribute to CO_2 reduction, air quality, noise and other environmental benefits from day one but that they can be modified to replace the diesel engines and take advantage of new green traction technologies. In many instances, they also already deliver beyond the current accessibility requirements.

1.7 Following an initial focus on UK rolling stock, Rock now operates overseas in Australia and mainland Europe where it is actively participating in the procurement of the latest technology hydrogen and battery traction fleets utilising its total rail business experience of delivering design, project management of global supply chains, asset management and maintenance strategies.

1.8 Rock is also extending its approach to transform the design and delivery of other essential rail infrastructure, including electrification, digital signalling and depots, as well as other new technologies to bring track and train closer together.

1.9 We are working with partners across the global supply market to deliver to the UK the very best of new technologies from around the world in areas including decarbonisation, power upgrades, ETCS and wider traffic management systems, all for the benefit of UK passengers.

2. What role rail decarbonisation can make to the Government's wider commitments on air quality to 2040

2.1 While rail travel is one of the lowest carbon modes of transport, only around 0.3% of global CO_2 emissions from fossil fuels come from rail (as compared, for example, to around 2% for global aviation), Rock considers it essential that the UK rail industry contributes to the Government's commitments on air quality by 2040.

2.2 Emissions from trains vary depending on how they are powered, whether by diesel or electricity, as well as how that electricity is generated. For decarbonisation of rail to be fully effective, as well as looking to greener self-powered traction alternatives, it will also be necessary to source the required electricity from renewable sources not dependent on fuels with high carbon content such as coal.

2.3 Rock considers that the future for domestic travel lies with trains and electric cars with a consequential modal shift away from air travel. Rock had therefore sought to invest in the new East Coast Open Access operation owned by FirstGroup which is to run between Edinburgh and London as a low cost, environmentally friendly alternative to air travel. Rock's intended investment in that project did not progress due to the decision taken at the time to

[1] See: https://rockrail.com/news/rock-rail-moorgates-fleet-helping-deliver-a-greener-railway/

support Heathrow's third runway. Hence the role that rail can play in the Government's wider commitments on air quality will require a joined-up approach across all modes of travel.

3. Whether there is adequate financial and other support from the Government for the development of alternatively fuelled rolling stock

3.1 In Rock's opinion the priority now should not be for any further financial and other support from Government for the development of alternatively fuelled rolling stock as the most viable alternatives – electric, bi-mode and hydrogen – have all been proven to work. Manufacturers are now in a position to compete for these products which will bring costs down and provide value for money.

3.2 Instead what Rock considers is required from Government is a clear policy that is capable of sustaining private investment for the delivery of viable schemes which in many cases will necessitate the delivery of new infrastructure to support the new rolling stock: such as hydrogen production and distribution and further electrification.

3.3 With the right commercial framework for the procurement of the necessary new infrastructure, Rock and its mainly pension fund based investors are keen to support the development of new infrastructure which underpins alternatively fuelled rolling stock as well as the rolling stock itself.

3.4 In light of lessons being learned from the Covid-19 pandemic as well as changes that have already been identified as part of the Williams review, Rock sees considerable opportunity for a new commercial model for both rolling stock and infrastructure that will deliver real benefits to passengers both in terms of decarbonisation and modernisation.

3.5 At the heart of Rock's new commercial model is the principle of investor reward based on increased passenger demand and revenue, thus putting passengers first and reallocating revenue risk and relieving the funding burden from the public purse to the private sector.

3.6 Rock has a track record of bringing-in and representing institutional investors (primarily pension funds). In an environment where direct Government funding will be directed to needed social infrastructure, such as hospitals and schools for example, Rock feels this institutional money could plug a gap and fund much needed transport infrastructure including that identified regionally thus allowing local communities to be involved in making decisions about improving passenger journeys and decarbonisation. With the right commercial model this investment can be unlocked.

4. How the industry is responding to the challenge of a carbon-free transport future by 2040 and developing technologies to achieve that

4.1 As noted in the introduction above, Rock has invested heavily in (currently diesel and electric powered) bi-mode trains, in part as a direct consequence of the DfT's position on rail electrification following the delays and cost overrun which occurred on the Great Western Main Line (GWML) electrification project. This led to the subsequent requirement for bi-mode trains for East Midlands Railway (EMR) on the Midland Main Line (MML) which Rock is now financing. In addition to the EMR fleet, Rock is also investing in bi-mode trains on the West Coast Main Line and on the Greater Anglia network. Rock also has a stake in the bi-mode trains that form the Intercity Express fleet on GWML.

4.2 As leading train manufacturers have stated in their previous written evidence to this inquiry, currently diesel and electric powered bi-mode trains have the flexibility to become battery and electric powered bi-mode trains with relative ease and have the capability for conversion to alternative fuels at the appropriate time. As electrification schemes move from limited

electrification to discontinuous electrification to full electrification, these flexible trains can ultimately be converted into full EMUs with all the additional bi-mode power sources removed thus reducing weight and hence running costs and providing all of the decarbonised benefits a full EMU train delivers (subject of course to the electricity supplying the overhead line coming from a renewable source).

4.3 This flexibility for conversion has been a key feature in Rock's investment decisions to date as Rock has financed each fleet on the expectation that it will be deployed over its design life of some 40 years, which in all cases runs beyond 2040.

4.4 As part of this, Rock is currently working with Stadler to develop solutions for both battery and hydrogen as diesel alternatives for the East Anglia network. And overseas, Rock is bidding on schemes to deliver hydrogen and battery trains in Germany: for passenger service and not just concept schemes. As stated above, these technologies already exist from a rolling stock perspective and the projects Rock is working on in Germany are significantly more advanced than those in the UK. Consequentially Rock intends to bring the knowledge and expertise it has gained from these EU projects across to the UK as the opportunities arise.

4.5 The infrastructure development required to maximise the benefits from these flexible trains is still lagging behind. To date the delivery of electrification schemes in the UK has been too expensive and too slow, in part due to the disjointed nature of the current rail environment which makes developing a complete solution (covering both track and train) very difficult. Rock anticipates that these issues will be addressed by the Williams review, but restructuring a rail system that is increasingly disjointed will take time which has potential to delay the benefits of decarbonisation.

4.6 In the meantime, Rock is looking to develop schemes whereby partial electrification coupled with diesel powered bi-mode trains can start to deliver passenger benefits sooner – as, for example, will be the case with the Rock funded EMR bi-mode fleet on MML. Then, as electrification can be rolled out further to cover all but the most expensive, complex areas including under bridges and in tunnels, a discontinuous electrification scheme can be coupled with bi-mode trains converted to battery power which will have sufficient power and range to cope with the discontinuous sections whilst recharging when running in electric mode under the wires. Ultimately as electrification costs decrease and further technical solutions can be developed, it may be economic to electrify the whole of routes thus enabling the battery powered bi-mode trains to be converted to full EMUs.

5. What challenges there are to deploying alternatively fuelled rolling stock on the GB rail network, particularly given issues with standards and loading gauge

5.1 As a developer, investor and asset manager, Rock is not best placed to comment on the technical challenges of standards and loading gauge: these are matters for the train manufacturers. However, when deploying alternatively fuelled rolling stock, Rock envisages a natural progression from Diesel Multiple Units (DMUs) being replaced by diesel bi-mode trains and then – as electrification rolled out – migration to battery bi-mode trains and then full EMUs.

5.2 However it may be the case that, prior to full electrification, retaining a diesel engine as well as battery capability may have advantages in (i) additional recharging capability, (ii) the ability to use both power sources for acceleration and (iii) the ability to utilise the diesel engine at its most carbon efficient (high) power loadings once accelerated to line speed when not under the wires thus preserving limited battery capacity for where it is needed or most appropriately used.

5.3 The previous seven yearly franchising process focused on capacity, revenue and cost but did little to incentivise innovation and long-term investment. Innovative new funding approaches involving the deployment of alternative fuel technologies will be difficult and will require longer periods of certainty. Hence the future operating model for the railways post the Williams review will need to incentivise this innovation and provide a political and legal framework which facilitates investment in long term sustainable models. For example, a greater focus on life cycle costs over a 20-35 years period will drive very different behaviours from the market. Like electric cars, alternatively fuelled rolling stock may have a higher capital cost, but there will be considerable savings in maintenance and overhaul costs over the asset life when compared with diesel trains (see below), and business case evaluation tools should recognise this.

5.4 The technology is developed and capable of deployment, what is missing is ambitious procuring authorities (PTAs, DfT, Devolved Authorities) who specify an output and allow Rock, and others, to design and procure the long-term solution acting as a catalyst in harnessing the global supply chain for UK passenger benefits. Rock would call on the Committee to empower DfT and other transport authorities to be bold, focus on carbon reduction and allow the market to deliver the solution.

6. What passenger benefits alternatively fuelled rolling stock could provide

6.1 In addition to the direct passenger benefits of CO_2 reduction, air quality improvement, noise reduction and improved performance both in terms of acceleration and reliability, modern flexible bi-mode electric trains will facilitate partial and then discontinuous electrification.

6.2 In addition to the cost savings it should generate, partial and then discontinuous electrification schemes should significantly accelerate delivery than would otherwise be achieved under a pure electrification timetable thus realising benefits to passengers and the wider economy sooner.

6.3 This will bring the benefit of better trains earlier which can then be flexed as electrification infrastructure is rolled out at a pace that the industry can sustain, with disruption at a level that passengers can endure and at a cost that the economy can cope with.

6.4 The other key benefit is that, with decarbonisation as the goal, new trains can be procured to significantly improve the customer experience while offering flexible platforms to accommodate the march to a fully electrified network.

6.5 This speeding up of delivery will provide additional indirect benefits to the UK supply chain and jobs. It will also drive further private investment in rail to deliver additional benefits alongside decarbonisation such as the digitisation of signalling. Hence the UK strategy should be considered as a collective output for the benefit of the passenger rather than only a route to zero carbon.

7. Whether alternatively fuelled rolling stock would be cost effective compared to EMUs over a 25-40 year life-cycle

7.1 Fully answering this question would need to consider the whole system (e.g. energy generation, transmission, storage, efficiency etc) as well as any associated rail infrastructure for EMUs. Evidence suggests that electrification is the best solution certainly for long distance, high utilisation lines. From Rock's experience in Germany we are also aware that hydrogen is likely to be significantly more expensive than other technologies.

7.2 That experience is showing that battery powered bi-mode trains can beat or be on a par with full EMU trains once the cost of electrifying the track is taken into account but this is highly dependent on the costs of electrification. It is well documented that the UK is considerably more expensive than the EU when electrifying a track kilometre.

7.3 Hence to fully benefit from decarbonising trains the UK needs to understand why electrification is expensive relative to the EU and identify how to drive down the costs, (RIA's Electrification Cost Challenge report[2] demonstrated there is considerable opportunity to significantly reduce the costs of electrification in the UK). As stated above, Rock's view of having partial electrification (to be as cost effective as possible) with bi-mode trains utilising alternative fuelled self-power technology for non-electrified sections, all procured via a privately financed scheme that is rewarded based on increased passenger demand and revenue, is the way to go in achieving this.

7.4 In a recent German study[3] where the comparative costs of diesel, hydrogen (with associated infrastructure), battery-EMU with partial electrification and full electrification where compared over a train's life in Net Present Value terms, it was the battery solution with partial electrification that won out. A close second was full electrification and last was hydrogen – even when compared to diesel. This comparison was done for specific routes looking for the best cost and environmental solution. Clearly an environmental comparison alone would change this order.

8. What the train interior of the future needs to have to ensure continued growth in rail travel, particularly amongst young people and future generations and to be fully accessible to all

8.1 Whilst this question is primarily one for train operators and manufacturers, from Rock's perspective as a train owner who is seeking for its trains to be fully deployed over their design lives, the key considerations are:

8.1.1. Flexible layouts: to deal with ongoing Covid-19 and other potential future social distancing and capacity requirements;

8.1.2. Ability to reflect changing attitudes to train usage: for example, a move to more leisure travel than commuting requires the ability to quickly change seating configuration/ standing/ luggage space etc;

8.1.3. Improved PRM facilities: with an aging population we are likely to see greater numbers of passengers with reduced mobility that need facilities, e.g. low floor/ step free access/ wheelchair space etc;

8.1.4. Easy to clean: to address current Covid-19 related concerns and the general perception of trains being dirty/ unclean; and

8.1.5. Dynamic real time customer information: a systems-based approach for the complete passenger journey, not just the period whilst on the train.

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[2] See: https://www.riagb.org.uk/RIA/Newsroom/Stories/Electrification_Cost_Challenge_Report.aspx

[3] See VDE's study of the "Evaluation of climate-neutral alternatives to diesel multiple units – Economic viability assessment based on the example of the Düren network at https://shop.vde.com/en/evaluation-of-climate-neutral-alternatives-to-diesel-multiple-units-download