HOUSE OF COMMONS

Transport Committee

Oral evidence: Trains fit for the future? HC 876

Wednesday 9 December 2020

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Watch the meeting

Members present: Huw Merriman (Chair); Ruth Cadbury; Lilian Greenwood; Simon Jupp; Robert Largan; Chris Loder; Karl McCartney; Grahame Morris; Gavin Newlands; Greg Smith; Sam Tarry.

Questions 84 - 167

Witnesses

I: Andrew Haines, Chief Executive, Network Rail; Helen McAllister, Strategy and Planning Director, Network Rail; Malcolm Brown, Rail Industry Decarbonisation Taskforce; and Andrew Kluth, Lead Carbon Specialist, Rail Industry Decarbonisation Taskforce.

II: Chris Heaton-Harris MP, Minister of State, Department for Transport; Rachel Maclean MP, Parliamentary Under-Secretary of State, Department for Transport; and Philip Luxford, Director, One Railway and Security, Department for Transport.

Written evidence from witnesses:

- Rail Industry Decarbonisation Taskforce (TFF0029)
- Department for Transport (TFF0022)

Examination of witnesses

Witnesses: Andrew Haines, Helen McAllister, Malcolm Brown and Andrew Kluth.

Q84 **Chair:** This is the Transport Committee's final evidence session in its inquiry "Trains Fit for the Future?" I ask our four witnesses on our first panel to introduce themselves, please.

Andrew Haines: I am the chief executive of Network Rail.

Helen McAllister: I am strategy and planning director for Network Rail.

Malcolm Brown: I am chair of the cross-industry decarbonisation taskforce.

Andrew Kluth: I am a carbon specialist at RSSB and I support the rail industry decarbonisation taskforce.

Q85 **Chair:** Welcome to all four of you. Thank you very much for being with us.

This inquiry has been set up to look at how the rail industry and rail network will be decarbonised. The Rail Minister, as he then was, Jo Johnson, announced that all diesel-only trains would be off the track by 2040, and that there would be a vision for how the rail industry will decarbonise. We look forward to hearing your evidence on how that will be done.

Perhaps I may open by putting a question to both organisations. You have both recently published key strategic reports about decarbonisation of the rail network. In your view, what are the key recommendations and actions that need to be taken to get us to the desired place by 2040?

Andrew Haines: The key thing we have identified is that there are different technologies, but that overwhelmingly electrification will be the answer for the railway given the current knowledge of hydrogen and battery, principally because much of the network needs to operate freight traffic, and a battery or hydrogen solution for freight is not on the horizon.

While we think there is a real place for battery and hydrogen, they have speed and weight limitations. Therefore, it is a mixed economy, but it is predominantly focused on electrification.

That means we have to start soon to meet the target for diesel trains in 2040 and net zero carbon by 2050. There are close to 12,000 single-track kilometres of electrification to be undertaken and we have to keep going with the current electrification programme. Those are the essential elements from my perspective.

Q86 **Chair:** Perhaps I may put the same question to the rail industry decarbonisation taskforce.

Malcolm Brown: One point we should make is that the two organisations are joined. We have mutual members, so we are not working independently of each other. The taskforce supports Network Rail and Network Rail reciprocates in supporting the taskforce.

The taskforce was set up originally to respond to the question Jo Johnson asked on 12 February 2018. The finding we arrived at in our first report was that, after thorough research, there is no silver bullet. Exactly as Andrew says, there is a mixed economy of electrification, hydrogen and battery.

The key was to identify the challenge and problem to solve rather than rush in with a solution. For various parts of the network, as Network Rail's TDNS report has demonstrated, electrification is the best solution, but for other parts of the network hydrogen or battery may be ideal.

It is important to note that rail continues to be one of the lowest forms of carbon for mass transport in the UK—a position that we want to continue to develop and hold as other modes of transport catch up with us.

Key to this in the second report was identification of the need to establish targets, policy, industry structure, delivery plans and further research to allow us to move to decarbonisation and net carbon zero by 2050, and no diesel trains by 2040 for England and Wales and by 2035 for Scotland. All of this is doable, but, as Andrew says, we have to start now.

Q87 **Chair:** Mr Brown, 15,400 single-track kilometres are not electrified, so they are up for grabs with the new technology. Network Rail has a proposal, or has certainly told the Government, that we should commit to a 15 to 20-year plan to give some certainty. Do you concur with that, and is there a danger that we might become wedded to one form over such a long period?

Malcolm Brown: We have been working with Network Rail. In our original report, we highlighted a very similar figure of single-track kilometres. That is based not on track kilometres but ultimately on the need of the passenger, to drive what is actually done. Rather than technology looking for a question, we are looking at what is needed for the UK economy and passenger and deriving the solution from that. We support that rolling programme.

It is a rolling programme and we know that battery and hydrogen technology is developing fast. Within that rolling programme there is a degree of scope. If, as Network Rail is suggesting, we start by prioritising the core routes that will almost inevitably have to be electrified, we can continue to make judgments. Key to this is the price point where the cost benefit of one mode or the other crosses over. We expect that to evolve over time, and we will keep an eye on that.

Chair: We will explore with Committee members the various forms of technology—electrification, battery and hydrogen. First, we will look at

some of the assumptions about the future capability of technology.

Q88 **Greg Smith:** There are assumptions about the decarbonisation strategy. The route to net zero has to be achieved by 2050—hopefully sooner. However, about 20 years ago a lot of assumptions were made about the future of fuel for cars that turned out to be wrong. How can we be certain that, while the technology for electrification is there today and is deliverable, with so many other streams being worked on and scientists, innovators and engineers all coming up with solutions—hydrogen trains are now running successfully on tracks in other parts of the world—we are making the right call to go for electrification rather than battery or hydrogen, or something else?

Andrew Haines: Maybe I can bring in my colleague Helen to deal with this. The important answer is that we do not have to be certain. This strategy is not set in stone for the next 30 years, but what we are saying is that a core part of electrification will make economic sense because so much of the rolling stock that is already available will be able to utilise it.

Moreover, if we wait to see whether technology emerges but then it does not, the cost and disruption of electrification compressed in, say, the last 10 or 15 years would be absolutely immense and almost certainly not economically affordable.

We think that the idea of a rolling electrification strategy where you carry on with some no-regret schemes now—we have identified those for the Government, some of which will be quite predictable—means we do not have to presume what will happen with battery and hydrogen technology.

It is true to say that nowhere in the world is anybody talking about a battery hydrogen technology at the moment that would be able to power 125 mph trains and very heavy freight trains over thousands of track kilometres.

Those are the characteristics that at the moment drive the recommendations. I entirely accept that that might change in due course. In the meantime, we crack on with no-regret electrification schemes.

Helen McAllister: I would agree with all that. The key is that right now we do not have to set in stone the next 30 years; we just need to be confident about what the right first steps are that take us towards 2050.

Hydrogen and battery technology is currently constrained by the quantity you can carry on the train to take it around the network. You need much less diesel to get a train a certain distance at a certain speed than you do hydrogen or battery power in volume or weight.

There is a number of routes for which it is expected that, even over the next 20 to 30 years, electrification will be the answer. There is absolutely a place for hydrogen and battery. We need to start establishing those on the network as well, but there are enough places where we can be sufficiently confident that electrification is the right answer for

decarbonisation, as well as providing a range of other benefits to passenger and freight users of the network that we can get going.

Q89 **Greg Smith:** To play devil's advocate for a minute before we bring in some of the other witnesses, electrification, especially if we are looking at this from both an economic and a wider environmental perspective, requires a lot of trackside infrastructure so that electricity continues to flow to the rolling stock for its entire journey. A massive infrastructure spend is required to electrify all those hundreds or thousands of miles of track that have been identified when we do not know whether innovators will come up with a hydrogen solution or a different one that will not require that massive infrastructure spend here and now, which environmentally will certainly visually blight a lot of communities.

Take an example from my constituency. There has been a debate over whether East West Rail should have been electrified from the get-go, but ordering bi-modal trains for East West Rail keeps open the window for hydrogen or something else that does not require all the electrification infrastructure to come online in the second iteration of rolling stock. Is that not a better option as we look at how we get to net zero?

Helen McAllister: I can understand the desire to wait for the better technology to come along. I have no doubt that over the next 20, 30, 40 or 50 years better technology will come along. It generally does. The present expectation is that battery and hydrogen technology will not evolve sufficiently to be able to cover off the level of train service required on the network in that timeframe.

We can wait. After a significant amount of research and consideration, our view is that we are unlikely to achieve the 2050 targets by waiting. Other countries around the world have taken the same approach to decarbonising their traction power as we have considered in the traction decarbonisation network strategy and as the taskforce has looked at it in examining hydrogen battery and potentially other technologies, but no matter how often we look at it we keep coming back to the fact that electrification is the most credible decarbonisation solution for long-distance, high-speed or heavyweight trains because of the expected technology constraints over the next 20 years.

Malcolm Brown: I would simply add to the point that Andrew and Helen have made. The rail industry is a large-scale capital asset and is long term, so we need to start now. We are not absolutely setting things in stone, but we have to make a start. What we cannot do is leave it until 10 or 15 years out in the hope that something new comes along. By all the research we did across the world, we are more or less following the same plan as other rail systems.

There is no silver bullet out there at this point. The combination of hydrogen and battery and electrification is the most pragmatic, sensible and cost-effective solution at this point. Please bear in mind that infrastructure to support hydrogen and battery is also intrusive. We just

have not seen it yet. We have the benefit of seeing pylons for electrification, but we have not seen the tanks required for storage of hydrogen, the trucks that need to carry it and so on. We need to think of the whole system, not just the end element of it.

Andrew Kluth: The economic life of new trains now such as bi-modes will probably extend beyond 2050. Bi-modes have only a limited decarbonisation benefit. Andrew Haines has already talked about the expense of investing in new infrastructure if you know it has a limited lifespan.

The other point you have alluded to is that any solution should not look at just output in operational emissions but whole-life and whole-system emissions. From the point of view of the work being done, in many cases electrification on the more intensively used lines will make sense on a whole-life and whole-system basis. It is useful to look at other areas only where they are clearly more beneficial. That is likely to be on less intensively used lines where the cost of the electrification infrastructure is just not merited.

Greg Smith: We have a lot to get through. While I could talk for hours on this, I will pass back to the Chair so we can plough on.

Chair: We will drill into each of the three technologies, but before we do that, staying on this theme, I turn to Karl.

Q90 **Karl McCartney:** I do not know who would like to answer this or whether you will be able to answer it, but as an organisation you provide a lot of power or buy it. Can you give me an absolute or approximate figure of how much electricity you as an organisation use per day? Is there a figure? Is it roughly the same as that used by a city the size of Birmingham, or perhaps a slightly smaller one like Chester?

Andrew Haines: Helen might be able to. I cannot give you a figure, but I can tell you that we are one of the top 10 users of power in the country. I believe that to be true. That is why how we source our energy is important. At the moment all our traction energy is matched by renewables, and we believe that within the next five years we will be using fully renewable sources of electricity at no extra cost. Can Helen give an absolute number off the top of her head?

Helen McAllister: I am afraid I do not have an absolute number off the top of my head for the kilowatts of electricity used by the rail industry per day. I think Andrew Kluth has something on that.

Andrew Kluth: The rail industry uses about 3.4 TWh a year. I cannot relate that to a city at the moment.

Q91 **Karl McCartney:** Andrew Haines has answered one of my next questions, which is that you get it from renewables at this point in time. Do you know by how much your organisation's use of power will have increased by 2040 or 2050? What will be the increase over the next 20 to

30 years? Will it be a 10% or 15% increase? What are your projections?

Helen McAllister: I do not have projections for the entirety of Network Rail. If we carried out the scale of electrification we are looking at, broadly we are looking at doubling the level of electrification. However, that does not mean we would necessarily double the use of power, because we would expect to become more efficient in our use of power, and we absolutely would expect to keep driving down both the use of electricity within Network Rail and across the rail industry and the carbon footprint of that electricity. Several programmes of work are going on within Network Rail, with RSSB and across the industry to look at how we can drive down our carbon footprint overall through better use of renewables, further efficiency, decarbonisation of our fleet, and so on.

Q92 **Karl McCartney:** I will return to Helen in a second. I do not know whether either of the Andrews can answer my next question. You have a figure for the yearly use of electricity. Andrew Haines, you mentioned that you are pushing towards having all of that from renewables. If your electricity usage increases by perhaps a third or a quarter—maybe not doubles—over the next 20 to 25 years and all of it was provided by wind power, how many turbines would you need to provide that? If it was all to be provided by what we call gas or coal-fired power stations, how much carbon would that produce? If it was to be provided by solar power, how many acres would have to be covered by solar panels to provide that electricity? You might not be able to give me that figure right now, but I hope you will be able to provide that in the fullness of time.

Andrew Haines: We can try to provide it in the fullness of time. I can tell you that it will not be through gas or coal-fired power stations because we made a commitment that it would be entirely through renewables. We can certainly get back to you with our best estimates.

Q93 **Karl McCartney:** If your providers cannot provide it where you need it—a lot of people will want electricity in the next 20 or 30 years—you will have to take it from where you can get it.

Andrew Haines: We have had pretty cast-iron assurances—we have spent a lot of time working this through—that renewable energy, including nuclear, will be available on the basis of all current forecasts of our requirements.

Q94 **Karl McCartney:** I did not ask, but if a number of nuclear power stations would be required to provide the power you need it would be helpful if you provided that data.

Helen, I do not know how it affects your business models, but how would you as a business operate if the price of electricity doubled in the next 20 to 30 years?

Helen McAllister: If the price of electricity doubled in the next 20 to 30 years, we would have to take another look. We will keep taking a look at the business cases of individual programmes of work as they are developed.

I would also expect the cost of carbon to increase over the next 20 to 30 years. I suspect there would be a level of balancing across the business case as we do that.

Andrew Kluth: If you are looking at price comparisons of different energy sources, we know that fossil fuels will be phased out, so any that is available will be much more expensive. If we are using battery or hydrogen, they will probably be based on electric sources of some description, so that will be dependent on the price of electricity. We do not know of any cheaper energy source other than electricity going into the future, so that is a good question. However, in terms of relative benefit of different traction sources, where electrification makes economic sense electricity will probably still be the better option in the medium to longer term.

Q95 **Chair:** Building on that theme, I understand that rail accounts for about 1% of the national grid in electricity used. If you were to electrify all 15,400 single-track kilometres, do you know by how much that percentage share of the grid would increase?

Helen McAllister: As for percentage share of the grid, no. If we are broadly doubling the level of electrification across the network, the widest assumption would be a doubling of the level of electricity required without efficiencies, which I would expect to see, so you are still looking at a low percentage of the overall drawdown from the supply.

Chair: Next, we will look at three things: electrification, battery and hydrogen. Taking them in turn, I will hand over to Robert Largan and Simon Jupp.

Q96 **Robert Largan:** I should start my question by clarifying that I am a big supporter of electrification. I think it is vital.

Playing devil's advocate for a moment, this question is to Network Rail. You forecast that the delivery strategy will involve infrastructure capital costs of between £18 billion and £26 billion, the majority of which will be focused on electrification, but why should the Treasury trust the cost forecasting given the previous high-profile problems that have arisen from electrification programmes?

Andrew Haines: The Great Western electrification programme and part of the north-west were clearly major challenges for Network Rail. They came after a generation when we had not done electrification and projects were underdeveloped, over-optimistic and did not use the latest technology. The standards they applied had not kept pace with emerging technology.

We have learned a great deal since then. The schemes we are now rolling out in Scotland, the midland main line, the latest elements in the north-west and our projections for the trans-Pennine upgrade are learning all those lessons. The cost of those schemes is now well within the range

identified by the Railway Industry Association, the supply chain, as being an efficient cost.

I think we can account for those schemes. They were nobody's finest hour, but we can demonstrate that we have already learned those lessons and are achieving better productivity and lower unit costs than we were in those schemes.

I believe there will be more to come. The supply chain has said that if we give it clarity and a long-term sustained programme, it will allow it to invest in technology and skills that further drive down the cost.

Helen McAllister: I think we have learned the lessons. There have been a number of different looks at the lessons to be learned from previous programmes of electrification. We understand where the efficiencies can be realised. We are looking to set the industry up for its best chance of success by allowing the supply chain to develop and have sustained and efficient delivery over a long time.

We are not requesting now a commitment to a 30-year programme of electrification. There will be a number of steps along the way where we can revisit the strategy and members can have a look at how electrification is being delivered and take a view on whether we are doing it as effectively and efficiently as we are currently confident we can.

Q97 **Robert Largan:** It is reassuring to hear that lessons have been learned.

The next question is on a slightly different tack. The TDNS has estimated that at least 11,700 single-track kilometres will involve lots of high-carbon materials such as concrete and steel. Mr Kluth, what is the best way of limiting the carbon cost of electrification?

Andrew Kluth: As I mentioned earlier, the key is that whichever option we go for on any particular stretch it is the whole-life, whole-system basis. We know that the infrastructure aspect of the railway does have a high carbon loading. We are completing a project to evaluate the carbon footprint of the railway. That will be used in setting targets and picking up on the work done by the TDNS in informing the best whole-life, whole-system options for electrification and alternative technologies.

Malcolm Brown: Picking up Andrew's point, we have to look at this as a whole system. The rail network in the UK is a continuous system. We must look at it as whole-life, whole-cost and whole system rather than individual elements of it.

Q98 **Simon Jupp:** I have more questions for Andrew Haines and Helen McAllister from Network Rail.

Andrew, you specifically mentioned clarity on the programme of electrification. How much involvement do you have in setting the priority of projects to electrify parts of the railway network?

Andrew Haines: I think we have a lot of involvement. Ultimately, the decision is rightly one for the Department for Transport because we have to demonstrate there is a business case that meets the normal appraisal criteria, but we have made initial recommendations as part of this strategy on the first phase, and we have very active, constructive dialogue with Ministers and officials on that.

Q99 **Simon Jupp:** How alive are the Government to your suggested priority list? Does it tend to change, looking at historic situations, or is it led by your advice?

Andrew Haines: There are two elements in the first phase. For example, if we take the trans-Pennine route upgrade, there may be a route where there are broader economic benefits in doing an upgrade and, therefore, the key decision is whether to electrify or not, and there are those parts of the programme where electrification in and of itself is the source of the benefits. What we have in the first phase we have been recommending to Ministers is a combination of those two things.

Q100 **Simon Jupp:** I am going to flag that the west country is very much up for electrification. Other colleagues have highlighted such things.

When you are trying to deliver something, you need the resources to do so. Are you confident that you have the resources, expertise and skills to deliver the Government targets in front of you to electrify the rail network?

Andrew Haines: If we start relatively soon and sustain the programme, our analysis of our own capability and supply chain capability suggests the answer is yes. The supply chain says it can do about 450 km a year and not a great deal more than that even in a peak year, maybe 600 km. That is when you will start to put pressure on the systems capability, but as long as we start in the next few years and sustain that programme we can have real confidence we can do that.

Other railways around the world demonstrate that that is a sensible level of delivery. What we have learned from them is that it is sensible to have a few fire breaks in that and not assume we are perpetually chasing our tail, so you have the opportunity to regroup, review the technology that we have already talked about and embed lessons, standards adjustment, technology and innovation as part of that programme.

Therefore, it is almost continuous but with a few fire breaks to be able to learn the lessons from earlier schemes.

Q101 **Simon Jupp:** I guess it is not easy to train people to understand the various levels of the structure you have to put in place to deliver these projects. Is it sometimes quite a struggle to recruit people who have the expertise ready to go? If so, have you had a recruitment drive recently? Are there plans for any?

Andrew Haines: Recruitment tends to be tough where there is not clarity of long-term pipeline. As the Great Western electrification programme comes to an end, the supply chain has to think about what it does with that capability. We have to match that with the maintenance capability. Therefore, for electrification on Great Western—not quite your part of the world—we have had to build a whole maintenance capability. Those are high-quality jobs requiring a trained, diverse and skilled workforce to maintain what is now quite sophisticated and sensitive equipment.

We have demonstrated we can do that again, but the key is some continuity, not leaving it all to the mad rush in 10 or 12 years' time.

Simon Jupp: That is very interesting.

Q102 **Chair:** May I ask Network Rail about the cost of electrification per single-track kilometre? In Germany, the cost is estimated at £450,000. In the UK, it is estimated as £2 million to £2.5 million. Learning the lessons and being more efficient as we have learned those lessons, by how much could we reduce that cost per single-track kilometre, and by how much could you further reduce it if we had a rolling programme where the supply chain was always kept in place?

Andrew Haines: I would have to caution comparing German apples with British pears. There is a range of criteria you can use for evaluating electrification cost. What are you referring to? Are you referring to the whole-system cost? Even within the British pear family there is a very wide range according to complexity. How many really difficult long tunnels are there? What is the general terrain?

Q103 **Chair:** Let's take out the German apple and focus on the UK pear. By how much can you bring down the cost now from the £2 million to £2.5 million on the basis of lessons learned and a more consistent programme?

Andrew Haines: Most of our schemes currently are in the range of £1 million to £2.5 million. Costs of £2 million to £2.5 million are always at the extreme end, but work we have done recently to identify schemes currently onsite in Scotland and in England shows we are within the range of £1 million to £1.25 million per single-track kilometre.

We think there is more to go for with supply chain efficiency if you have longevity of programme. That compares pretty well with the German costs. When you look at it on a like-for-like basis, that is pretty comparable with Deutsche Bahn, which is one of our reference points.

Q104 **Chair:** If you had a rolling programme where you kept the supply chain in place and it was more consistent, to what figure do you think you could bring down the cost of £1 million to £1.25 million?

Andrew Haines: It is hard to say, in part given the range of infrastructure. Certain parts of the trans-Pennine route upgrade will be

very much more expensive because of the nature of the tunnels and terrain, but there are certain single tracks where you can get below the £1 million figure. I am not saying that as an average, but certainly for the easiest and most straightforward parts we would be aiming to get down to just below £1 million per single-track kilometre.

Chair: I am grateful for that clarity. Let us move on to battery.

Q105 **Lilian Greenwood:** In this month's edition of *Rail Engineer* there is a section on electrification and power. It says, "Electric trains are more powerful and efficient than self-powered trains. No amount of research and innovation can change the validity of these points which reflect the laws of science and space constraints."

Network Rail's strategy estimates that only 3% of available routes are suitable for battery usage. Is that article right? What are the key limitations of battery capability, and how might those change in the future through research and innovation?

Malcolm Brown: The statement in the magazine is correct at this point in time. We go back to the known unknowns. How is battery technology going to develop over the years? As to the physics of it, when we run a train with battery, a diesel engine or hydrogen we are carrying a lot of weight and space around with us, unlike electrification. With electrification, the power comes in and goes to the motor, whereas if we are running a battery train we have to carry the battery with us. That clearly puts a draw on the energy of the train itself and takes up space.

There are then the physics of how much power we can take out of the battery to drive the motor to get the train to go fast. At this point in time, electrification, as Andrew Haines, Andrew Kluth and Helen have said, is the most efficient route in certain areas.

What will be a challenge, and we are looking at it very closely as one of the limitations, is charging. When we do introduce battery trains, how fast can we charge the battery? What is the type of range we can get? That is where we are seeing developments in technology going.

Andrew Kluth: I think other participants today have been explaining certain advantages of the different schemes: electrification, hydrogen and battery.

Batteries are really good for what you call short-hop, frequent-stop trains where you can recharge the battery in the braking and replenish the kinetic energy. They work very well under those circumstances at lower speeds. They are very useful to supplement acceleration in other trains, but because of the limitations on battery weight the advice we receive is that they have a fairly constrained optimal operating capability, so that 3% is based on where they are likely to be most effectively used within the actual operational constraints of the railway.

Q106 **Lilian Greenwood:** My understanding is that batteries are getting lighter

all the time. How much better are they expected to become in the next few years?

Andrew Kluth: The last time I was reviewing this, the current trajectory was an improvement of maybe 10% or 15% a decade. That is a fairly reasonable scenario at the moment. Limitations on the current lithium-ion technology are fairly well understood. If batteries are to be able to extend to a much greater performance capability you will need new technology. Estimates being made now are based on reasonable projections of improvement of the current technology.

Q107 **Lilian Greenwood:** May I turn now to Network Rail? Batteries are made from minerals mined all over the world, and some ethical questions are raised about that mining. The process of production also generates significant levels of carbon. They are difficult to recycle and would have to be replaced several times over the lifetime of a train. How have you taken those issues into account within the network decarbonisation strategy?

Helen McAllister: There is a number of very good points in there.

The rail industry has a good record on the ethical procurement of materials. We procure in line with the standards set out across the UK.

As for the resources within the batteries, there are environmental disbenefits in the mining processes. They are a scarce resource in themselves and therefore may not be as freely available in 20 to 30 years' time as they are now, but they do have a role to play in the decarbonisation of the network as it stands in the short, medium and probably longer term as well, in short, frequent-stop services, as Andrew Kluth described.

In taking this into account in the traction decarbonisation network strategy, we have looked at the lifetimes and they are factored into the leasing costs of rolling stock in the economic modelling within the strategy. The environmental disbenefits of the mining process are not included in traction decarbonisation. We very much looked at how, as you are operating when the power is at your network, that affects decarbonisation, not the supply chain factors all the way back.

We have had to draw a boundary around the analysis we have done to make it deliverable and manageable, and we have drawn that around the rail industry itself. We have assumed that we are able to procure electricity to run electric trains and we will be able to build electrolysis points in industry depots to generate clean hydrogen, and we have assumed that batteries will be available for rolling stock as they are required at the level we have forecast in TDNS.

Q108 **Lilian Greenwood:** Karl asked about the electricity need when running electric trains. What is the electricity need for running battery trains, because effectively you are taking electricity, storing it in a battery and turning it into kinetic energy on the train? I have no idea of the

comparison with electricity that you need to power batteries or conduct electrolysis. Can you help me out on that?

Helen McAllister: I do not have numbers. Andrew Kluth may be able to answer better than I can. Electrolysis is electricity-hungry and battery charging obviously requires electricity, but I will hand over to Andrew to see whether he has better data than I do.

Andrew Kluth: Batteries are generally pretty efficient in charging. I cannot remember the exact figure, but probably they have a minimum efficiency of 80% or 90%. With electrolysis, based on current technology, the energy content of hydrogen you generate will be about one third to one quarter of the electricity needed to produce it under electrolysis. Therefore, the benefit of hydrogen is not that it is efficient—it is comparable with thermal combustion at the moment in the efficiency of energy—but that in principle you can use renewable energy, perhaps in remote areas or areas where it is difficult to get mains supply for electrification, for instance, and apply that to generating hydrogen, which can be used on a hydrogen train, and you will know you are taking it from a clean source. It may be relatively inefficient, but you know that it is zero carbon power.

Q109 **Chair:** On batteries, where there is a third rail—Southern is a good example—there are gaps, so you have to use diesel all the way through even though most of it is electric. That seems the obvious example of where battery trains could fill that gap. Porterbrook has one such example, but it still cannot seem to get it on to the tracks. Is that because there is a safety issue with the third rail?

Malcolm Brown: The point you make is: can you use battery as a stopgap between where you drop off a third rail and then on to it? The same applies to overhead wires and diesel engine trains. Work is going on to develop a hybrid drive that is able to take its core power source from either overhead or a diesel engine. It charges a battery and we can then switch to that when perhaps we do not have overhead, or, if we are running a diesel train into a city centre, we can run it in on battery, which suits the profile of the battery power that Andrew Kluth previously described. This is very nearly hitting the tracks in a trial, and it is being developed in Rotherham.

I must stress to the Committee that a lot of the supply chain industry is really pushing this in the UK. It is a really good news story. What the rail industry needs to do is grab that and productionise it so we can export it to the world. We are almost there on that one. That would work as a stopgap as other technologies develop and we phase out, for example, diesel trains, so there is an answer being developed at the present time.

Chair: That would take two diesel lines out of Southern. You would completely decarbonise that part of the network, which would be quite impressive. Let us move to hydrogen.

Q110 **Greg Smith:** Earlier in the session reference was made to the Government's 10-point plan, part of which promises a world-leading hydrogen strategy and the ability by 2030 to produce power-station levels of low-carbon hydrogen, yet in the Network Rail strategy hydrogen amounts to only about 6%. How can the rail industry catch up with the ambition Government are setting around hydrogen?

Helen McAllister: I would go back to the core point. We have looked at what the railway needs to deliver for the people who use it and the decarbonised power options that can deliver those outputs for those users. We have identified where we project that hydrogen can deliver the outputs that are required for the passengers and freight trains that travel on the network. Up to 1,300 km of rail would use hydrogen in an end state in 2050. Further analysis has shown that we can use hydrogen as an interim solution in areas of the network where electrification is unlikely to be in the first couple of tranches—you can use hydrogen trains in the interim. I think that supports the hydrogen economy as well.

We have also looked at areas of the UK where you would apply hydrogen and where there can be efficiencies and they can reinforce the development of a hydrogen economy. There are areas of Anglia where we have looked at the use of hydrogen trains. We think there could be a hydrogen economy in Lowestoft that the use of hydrogen on trains could help support and develop. Equally, in north-east England hydrogen as an interim solution for decarbonisation could help support a growing hydrogen economy.

Therefore, we have looked closely at how the use of hydrogen in rail can help support and draw on a hydrogen economy in the rest of the UK, and the extent to which it can be used in the long term and interim as part of that.

Andrew Haines: Our assumptions are based on what we see across the global transport system. That is why we have currently pitched this level of hydrogen usage. If you want a mixed traffic railway that has freight and long-distance services at over 100 mph, there is nowhere in the world predicting that hydrogen will be able to do that for you in the next 10 to 15 years.

That is why we have come up with the current plan. As we said previously, that does not mean that if that technology shift happened beyond 2035 you would not see more hydrogen if there was that breakthrough. What it does not do is take away the need for electrification in the intervening period; otherwise, you are dependent, frankly, on speculation that somehow technology is bound to emerge when there is no pathway to that at this stage.

Q111 **Greg Smith:** To play devil's advocate for a moment, if we come from the presumption that everything was constantly under review and innovators and engineers do not come through with this hydrogen technology in the timescales we need, why are we going for such a pessimistic approach, if

I can put it that way, in long-term planning for hydrogen rather than embracing what is coming out of industry and the developments we have already seen? The Committee has had evidence from Alstom. I fully accept that it has a commercial interest in this coming good for it, but it is talking about 300 to 400 hydrogen trains in the UK initially. Why can we not go with that ambition? We are not pressing the green light on it right now, but why not beef up the hydrogen ambition over the next 30, 40, 50 years for the UK rather than just presume the technology will not come good?

Andrew Haines: You could do that if you wanted routes where you could not have electric freight or electric long-distance services. That is why I said at the outset that the rail system is a network. If we want a wide network of electrified freight and long-distance journeys travelling at 125 mph, those are the limiting constraints on a hydrogen system above all else. You could invest in hydrogen technology, but you would then either have to say you want to retain diesel for those services or invest in electrification and hydrogen.

There may well be a broader economic case to do that, but it is then not a decarbonisation strategy; it is driven by the broader economic benefits of hydrogen. Alstom is not telling us that it has a pathway to freight locomotives through hydrogen or indeed to 125 mph passenger trains.

That is the point. You could have very many suburban trains on hydrogen. That does not take away the need to electrify if you also want those other types of traffic to be used on the network. That is why the strategy is what it is. It is not because we do not like hydrogen but because it does not solve those two network problems.

Malcolm Brown: I would like to build on the point Andrew Haines has made. In the research we did in the decarbonisation taskforce, we spoke to people. If you speak to somebody involved in hydrogen, they will say it is the best thing ever and it is the answer to all problems. If you speak to somebody involved in battery, it is the best thing ever; it is the answer to all problems.

What we have done—TDNS and Network Rail have built on this—is ask: what is the problem we are trying to solve and, therefore, what is the best solution we can see at this point? We are not coming up with how we can use hydrogen in the best possible way and then exclude other forms of energy storage, including battery. I would get exactly the same from battery.

It is very important for the cost base and passengers to focus on what problem we are trying to solve and then get the best solution available, but build in the firebreaks that allow us to reassess at the price point, as I described in my opening statement, and say, "We now have new technology and know something different, and therefore our view will change."

Andrew Kluth: Part of this comes back to the capabilities of the different technologies. Hydrogen has an energy density limitation, which means you cannot generate the power you need to move a freight train at the speeds required across a mixed-use network, or drive trains very fast. That will probably always be the case.

Batteries have limitations about the amount of energy they can store, so if you are just running a battery train in isolation it has limitations on range and speed. They have advantages in some circumstances. I think the challenge is to keep revisiting where those advantages lie and where the improvements are taking place to see whether there is a price point where they become advantageous under certain circumstances.

The other point here, which Andrew Haines mentioned, is that to deliver the freight and high-speed trains you need to put in the infrastructure in the first place. If you are putting in infrastructure for electrification, one of the questions you need to ask is whether, if you are putting in infrastructure to power battery or hydrogen trains, that is just an excess cost rather than being an opportunity to use an electrified network as efficiently as possible.

Greg Smith: We could talk about this for hours, but it is 10.25, so I will hand back to the Chair.

Chair: We have five scheduled minutes left and both Ministers are in the room. We have further questions to ask. Let us turn next to decarbonising freight.

Q112 **Ruth Cadbury:** On the question of clarifying the problem we are trying to solve, how can the rail freight sector be decarbonised while preventing modal shift to roads? This is probably a question initially to Helen and Malcolm. The National Infrastructure Commission has recommended that road and rail freight should have a common single target to decarbonise by 2050. Do you agree?

Helen McAllister: At the moment, the answer to how we decarbonise rail freight is significant electrification of the rail network, because the other technologies do not have the power capability to move a heavy freight train around, unless you start devoting wagons to fuel on the train, which destroys the economics.

Rail freight has a huge part to play in decarbonising surface transport overall, which I think then brings up the answer to the broader point and the single target.

There will be costs to the rail freight industry of decarbonising as well as costs to the rail industry of infrastructure. If freight is not to be incentivised away from rail through decarbonisation, incentives will need to be put in place to prevent that from happening. It is important that we look at decarbonisation of surface transport and freight overall rather

than just decarbonisation of rail freight or just decarbonisation of passenger car vehicles.

I have not yet considered a single target for carbon from freight. It is an interesting idea. It would be good to see how the transport decarbonisation plan comes at this. There is a role for freight, before we do any electrification of the rail network, in decarbonising surface transport. If you move freight on rail using a diesel engine, it gives you fewer emissions than if you move the same amount of freight on roads in lorries.

Currently, there is not a solution for heavy freight on roads in lorries that is zero carbon, but there is for rail freight. We need to look at the really interesting balance across the short, medium and long term to hit 2050 decarbonisation targets, including freight. That might involve a different mix, different methods of transportation and a different range of incentives across that 30-year period for different modes, but it does involve electrification of the rail network for freight use and the carbon benefit, as well as the journey time benefit, capacity benefit and other benefits, including air quality, that that brings.

Malcolm Brown: I echo what Helen has said. Rail freight is extremely efficient in terms of carbon in carrying goods compared with roads.

More specifically on your question about a single target, I suggest that what we have to avoid is setting targets that encourage perverse behaviour. For example, if road were to have a target or incentive in one direction that caused people to move freight to road, that would be very counterproductive. I would argue that we should incentivise more freight to move from road to rail, because even at a standstill point rail freight is far more efficient in terms of carbon.

Electrification is key. We are looking at different technical solutions, but the physics of simply having enough grunt in a locomotive to pull what we need to pull and do it efficiently mean that right now electrification and, unfortunately, diesel engines are the best way of doing that.

Q113 **Ruth Cadbury:** Andrew Kluth, do you believe there is a point when hydrogen and battery technology will be sufficiently developed to make them viable for use in rail freight?

Andrew Kluth: On a mixed-use railway it will be very difficult to make them work. In principle, you could run hydrogen battery freight trains, but they would run under very constrained circumstances. We have done some work on this already with one research project. It has modelled an ideal freight route and said it is possible to do it, but there are certainly questions about a mixed-use railway being able to move at sufficient speed in between passenger trains passing through, the length limitations on the railway, the need to put in extra fuel cars and so on.

Practically, it does not look like it will be a viable option, particularly on heavily used routes. We have committed to do further work to see what might be possible, but I would say that on a mixed-use railway that is intensively used it does not look like it is going to be practical.

Q114 **Gavin Newlands:** I have one quick question. Perhaps I can get an answer from one or both groups represented here.

This question has been set almost as road versus rail thus far, but there is potential for both modes to work more efficiently together. I do not know whether you are aware of the Malcolm Group in my constituency, which proposed an increased HGV axle weight of 48 tonnes for a short distance from a rail terminus to try to increase inter-modal ability. A Government consultation opened today and goes on until 4 January. Have you submitted a response to this consultation? If so, can you give us a flavour of it?

Malcolm Brown: To pick up the broader point, we have to look at it as a system. Transport is a system; it is not individual pieces. You have heard us say that before. We were not aware of the consultation, but I will go and find out and put in a submission.

Helen McAllister: For brevity, I echo what Malcolm said. You need to look at it as a system. I was not aware of the consultation. I will go and find out about it and see if we can put in a response.

Gavin Newlands: I will expect my DFT fee shortly for promoting the consultation.

Chair: We will expect your register of interests to be updated. Let us look now at research and development funding and SMEs.

Q115 **Chris Loder:** I have a question for Andrew Kluth. The taskforce has said that research and development funding for rail lags behind that for other industries. Do you have a brief view on what funding is sufficient for the requirement?

Andrew Kluth: In terms of the solutions that have been discussed today, it is not necessarily a question of the amount of research funding to develop a sensible solution. Helen may be able to address this better within the TDNS context. Part of it is: what technologies do we need to support and accelerate where we know the opportunity exists? Within RSSB we are answering specific questions, but that fits within the wider work being undertaken by manufacturers, Network Rail and other members of the supply chain in delivering those practical elements. The question that needs to be asked is not about the research but how you deliver it to the railway.

Q116 **Chris Loder:** You do not have a view on an adequate level of funding.

Andrew Kluth: I have not looked at that and have not been asked to look at it in particular.

Q117 **Chris Loder:** If you have time, you might be able to share a view with us at a later point. That would be appreciated. The Treasury has more recently announced its review of the Green Book approach to economic cases. Do you believe that that will affect your research and development work or the ability to do it?

Andrew Kluth: I do not think that in principle it should affect the ability to do that research and development. It is an input into the process, but it does not constrain it.

Q118 **Chris Loder:** It may not directly constrain yours, although it may affect other wider programmes—enhancement or electrification programmes—but you definitely do not think that would have any direct impact on you.

Andrew Kluth: It will modify the input parameters, but I do not think it will necessarily affect the ability to do any particular work.

Q119 **Sam Tarry:** To pick up where Chris left off, last week there was an answer to a written question from the Minister for Rail in which we learned that Network Rail's enhancement budget had been cut by about £1 billion in the recent spending review. That has been criticised by people like TSA as short-sighted and reckless.

Andrew, whether it is for R&D or it is focused purely on the enhancement side, could you kick off by confirming to the Committee exactly what rail development activity is planned for control period 6? Will that be impacted by that drawback of funding? In the grand scheme of things of Network Rail, £1 billion is not massive, but it is pretty huge. I was wondering about the impact of that on the enhancement budget, because we are talking about a whole range of projects that will need serious enhancements if any of them are to move ahead, whether it be hydrogen and so on. You need to build the additional infrastructure.

At the moment we need to be getting the basics right. The fact is that so many electrification projects have been cancelled in the past few years. At the time Chris Grayling was Transport Secretary a whole range of reasons was given. It was discovered later that the reasons were purely financial. Is there a list of, say, locations that would be impacted by that cut of £1 billion?

Andrew Haines: Let me first clarify that as far as Network Rail is concerned research and development is treated separately from enhancement. In our current five-year settlement—we are just halfway through the second year—we have seen a very significant increase. Effectively, we have £250 million for research and development in that five-year period, which is a massive settlement compared with previous periods, so that is good news.

We are aware of the Treasury's decision as part of the spending review. We are still working through what that means with officials in the Department for Transport. The way the enhancement budget now works is that schemes are already committed to various gateways, so the

difficult choices we now have to make are about what schemes will be impacted by that.

That work has not yet been done. We have an informal notification of the spend profile, but we are actively working with officials. I imagine that work will go on until early in the new year before we are able to say anything more specific.

Q120 **Sam Tarry:** I am sure the Committee will be interested when you do have that detail on where the impact will be. If you write back to us, that would be very helpful. I think a lot of MPs would be concerned about particular projects they thought would be going forward but now may not be because of that decision.

Andrew Haines: That might be a matter for the Department, but I am sure one of us will be ready to write to you when that work has been undertaken.

Q121 **Chair:** On that front, are you saying that the first you knew about the reduction in the five-year enhancement budget from £10.4 billion to £9.4 billion was when it was announced—you had not discussed what that would mean beforehand?

Andrew Haines: I am not saying that at all. I am saying there were various discussions, but what we have not seen is the profile. We work in five-year periods and we are halfway through year two. What we have not yet seen is the disaggregated profile over the three years. We also do not believe that at this stage a decision has been taken by the Treasury on which schemes it affects. It is for the Department for Transport and ourselves to work through how that might impact on schemes. That is what I am saying.

Q122 **Chair:** You said you did not know what the impact would be. Therefore, you could not really have consulted to tell them the impact because you cannot tell us that yourself.

Andrew Haines: We did not know the spend profile and there has not yet been an agreement on which schemes that affects; that is, which schemes might be protected and which might be delayed. That is the work that now has to be done with officials in the light of that decision.

Chair: I thank the Committee for allowing me a bit of time to ask that. Andrew Haines, Helen, Malcolm and Andrew Kluth, thank you very much. You have given us fantastic expert evidence, and we will certainly take that on board when it comes to shaping our report and giving our recommendations. May I wish you a good rest of your morning? Thank you for your time.

Examination of witnesses

Witnesses: Chris Heaton-Harris MP, Rachel Maclean MP and Philip Luxford.

Q123 **Chair:** We are delighted to be joined by two Ministers and one of your officials, who should be on the screen as and when you need him. I ask the Ministers to introduce themselves.

Chris Heaton-Harris: I am the Rail Minister. At these fairly festive times, I am more like the ghost of Christmas past and present, talking about schemes in the here and now.

Rachel Maclean: Does that mean I am the ghost of Christmas future?

Chair: A nice ghost.

Rachel Maclean: I am a very friendly ghost. I am here in my capacity as Minister for the future of transport and Minister for decarbonisation of transport more widely.

Q124 **Chair:** We are delighted to receive you both. Welcome. We have had a fascinating series of evidence sessions on this front. We will go through the various technologies, and we are grateful that you came early to listen to the first session.

I cannot help but return to the last point we touched on with Andrew Haines. We are talking about investment in the railway and how much this is going to cost. It appears that Network Rail's five-year enhancement programme is being cut by £1 billion. Is there a feeling about how that is going to impact on the ability to deliver some of these projects, or is it still to be shaped?

Chris Heaton-Harris: Andrew Haines gave the perfectly correct answer. Can I start by saying that the Government are pumping a huge sum of money into our rail industry at this point in time? In intervention terms, the Government will put about £10 billion into the emergency measures agreements and the ERMA period of time.

Therefore, it was unsurprising that the Treasury looked at the rail budget, especially based on previous delivery periods. In the previous control period, the profile of Network Rail spend fell away and caused a number of issues.

Add to that things that have happened with covid and the pandemic where a number of projects have already moved to the right. The big Kings Cross work that people will see being done this Christmas was meant to be done at Easter. Other major projects will be moving as a direct effect of the economic consequences of the pandemic.

All those were weighed up by the Treasury. As you would expect as a Department, we gave a lot of information about all the schemes we have at various stages in the pipeline and this was the result, but we do not

know at this point in time which projects will be affected because it all depends on how they progress going forward.

Q125 **Chair:** This session is very much about decarbonisation, but I wanted to take this opportunity to ask you as you are before us. I can see that your official has joined us, so I should ask Mr Luxford to introduce himself.

Philip Luxford: I am director in the Department for Transport responsible for environmental policy.

Q126 **Chair:** Mr Luxford, I will allow the Ministers to bring you in as and when they choose. Let us focus on the rail industry decarbonisation taskforce report. Your predecessor, Jo Johnson, announced ambitious plans to decarbonise rail by 2040. The taskforce final report has been with the Department for 17 months. Minister, should we take it as read that the report is now being implemented, or is that still to be signed off by you?

Chris Heaton-Harris: It is yet to have final formal sign-off by me, but lots of the elements of it are already being enacted. The formal nature of sign-off has gone by the bye because of other elements that have taken up our time, such as covid deployments and stuff like that.

The taskforce recommended a whole host of important things committing the railways to play a major part in contributing to the national net zero 2050 carbon budget—we will be able to tick that one off in the next few weeks—and set out a clear policy position to define the expectation of rail in delivering a net zero carbon economy.

The expected scale and pace of the railway decarbonisation will be set out in a plan going forward, which we will announce shortly. You are about to see the formal workings of all this come out of the sausage-making machine of the Department. We have not just been sitting on our hands. We have been talking with the industry and working with Network Rail to make sure that these things are ongoing in decisions that we have made in the last year.

Q127 **Chair:** Minister Maclean, do you want to add anything about the report? Do you have to sign off on it as well, or is that for Minister Heaton-Harris?

Rachel Maclean: I have no doubt that it will probably wing its way to me as well. The decarbonisation agenda has been front and centre. You will know from my previous appearances in front of this Committee that, even in the time of covid when we have supported our public transport system in many ways, we have not stopped working on this important decarbonisation agenda.

We will publish our transport decarbonisation plan. That has slipped a little bit from my previous undertakings to this Committee. I can go into that in detail if you like. That plan will tie together all the very good work that has been done by Network Rail on the traction decarbonisation network strategy document, which has fed into our transport

decarbonisation plan. All of that has come together, and we will take account of it all and publish it in our TDP.

Chair: Thank you for the opening. We are going to move on to discuss each of the technology forms—electrification, battery, hydrogen—but, before we do that, we want to talk about Network Rail's traction decarbonisation network strategy.

Q128 **Greg Smith:** You will have heard in the earlier session, Minister Heaton-Harris, that there is a debate going on about whether the balance is right between the different forms, especially given the Government's 10-point plan that promises a big investment and increase in hydrogen. Do we have the ambition for hydrogen right in what is being set out for the next 30 years alongside battery as well, not least given—as I brought up in the previous session—the massive infrastructure spend and build that would have to go into the wide-scale electrification of existing tracks? Is that balance right going forward?

Chris Heaton-Harris: The Secretary of State has been very recently to HydroFLEX to see how hydrogen can work on our railway. The traction decarbonisation network strategy provided us with recommendations to inform decisions about how we remove diesel trains from the network. It does not really say, as your previous witnesses said, that we want you to commit 100% to hydrogen or a different technology. It offers us the best options for each kilometre of track across the network.

In your questioning of the previous witnesses, you asked whether we should be more ambitious. The Government are extremely ambitious when it comes to hydrogen, and their recent announcements about Teesside demonstrate that. It will play a place in rail without a shadow of a doubt. Looking at all the different rolling stock companies and what they are doing in investment terms in R&D in this area, it is bound to play a part; I honestly could not tell you how much at this point in time.

Q129 **Greg Smith:** I do not doubt the Government's ambition on hydrogen at all. My questions in the previous session were more whether the rail industry recognised that ambition of Government and was rising to the challenge. The 6% figure may seem low.

Chris Heaton-Harris: I think they are. Chair, you raised the Porterbrook example. They are investing in a campus where they are developing a different technology, and hydrogen is a big part of that.

I was on a call with the supply chain only last week where a general invite went out for people to come and see what this train can do and test their ideas on what would be a working train. I think the rail industry is stepping up, and there are some quite exciting ideas as to how we can use this going forward.

Rachel Maclean: I agree with Chris. I will call him Chris, because otherwise I will have to say Minister Heaton-Harris, and it is such a mouthful.

The point about all this work is that all we are looking at here is a horizon, 30 years out, to reach net zero by 2050. Obviously, there will be developments. What we decide to do today and where we put our Government-funded taxpayer money into new technologies could be radically different in 10, 20, or even 30 years' time.

It is very important that we are agile. It is quite hard to be agile in an industry like rail, where you are dealing with very long horizons and infrastructure decisions, but, nevertheless, that is a balance that we are mindful of as Ministers.

Certainly, in my role, on the future of transport decarbonisation, I see hydrogen playing a massive role across all modes of transport. A lot of it is held by BEIS, because it is the owner of the production side of it. There has been a lot of investment and impetus put behind that in the 10-point plan and other announcements.

We in Transport are doing our own work on this. We have set up the transport for hydrogen hub in Teesside, which will help us to operationalise and deal with some of the practical challenges and problems about producing it in a green way and then commercialising it. There are a lot of questions to answer, and we want to do that on a cross-modal basis. The rail industry will be part of that, of course.

Q130 **Greg Smith:** That is very reassuring.

The next point I want to turn to is the balance. Is it right to say that one of the constraints, even as we look at a 10 or 15-year plan—the Committee has heard evidence that the rolling stock market and the production of the rolling stock is quite a volatile one—is that we might get boxed in by the ability to order and get in a timely manner the new rolling stock that is going to fit, and having the different options now of so many hydrogen units, battery units, bi-mode units, full electric units, and the market might dictate some of this as well? How concerned are you by that volatility in the marketplace?

Rachel Maclean: I will let Chris answer that first.

Chris Heaton-Harris: I am not overly concerned, because all these plans are made on a case-by-case basis, so it is horses for courses. That is old transport technology. We look at these on a case-by-case basis. Everybody expects that the technology will change a huge amount over the next three decades.

I have been Rail Minister for 18 months. Fortunately, I was able to leave the country back in February to go to an expo in Dubai to see what we are selling in rail terms across the world. The developments that have happened in the course of my time as Rail Minister have been extraordinary.

We push really hard from the centre for innovation in electrification, batteries, and hydrogen. We really want these changes. At some point,

the industry has to buy things—absolutely. It is at that time you get set in. It is done on a case-by-case basis. That is almost as flexible as we are likely to get on such big assets that last for such a long time.

Rachel Maclean: We expect the industry to invest and they have to work within a commercial framework. There are challenges at the moment because of the covid situation. All the work that we do in our cross-cutting TDP will have to consider all that as well as where we go, what is likely to deliver that carbon reduction in the short term, and balancing that with the market factors further out.

Chair: We will now touch on each of the various technology forms—electrification, battery, and hydrogen. We will start with electrification. Actually, no, we are not, because I have got that wrong yet again. It is going well for me so far. Sam, I will come to you first before going to the modes. It always involves you when it goes wrong for me.

Q131 **Sam Tarry:** I forgive you. I am sure it is not a conspiracy, Chair.

Minister Heaton-Harris, you heard my question to Andrew Haines. I want to go over that again. I am concerned that the announcement of 10% of the entire railway enhancement budget being cut will have a knock-on impact. I know there is a lot of money going into other aspects of the railways to keep them running. Did your Department have specific discussions with Network Rail beforehand? I want to confirm that that did not happen.

Chris Heaton-Harris: Andrew Haines confirmed that it did happen. Network Rail constantly talks to us about different projects, where they are in the pipeline, where they are mooted to get to, and what the BCRs and value for money for the taxpayer might look like. We, as a Department, presented a very thorough case to the Treasury in the spending review. We are analysing what came back to see, based on what our predicted spend is and what we know about projects that are slipping because of the pandemic and other things, what that means for the projects for this control period.

Q132 **Sam Tarry:** One of the key things for the decarbonisation strategy, whatever the technology is moving forward, is electrification. What concerns me is that, if you look at the list of places that have had cancellations in the last few years outside of south-east England, you have Cardiff to Swansea on the Great Western main line, Kettering to Nottingham, Derby and Sheffield, and Oxenholme to Windermere. Could they be brought back on stream as priorities?

Chris Heaton-Harris: All those projects feature heavily in the Network Rail report. For the record, this Government have managed to electrify more lines than the previous one. I am sorry to make a political point. In the last three years, we have delivered electrification from Gospel Oak to Barking, some on the West Anglia main line, Stockley Junction to Maidenhead, Maidenhead to Didcot, Reading to Newbury, Didcot to Wootton Bassett, Wootton Bassett to Bristol Parkway and Chippenham,

Bristol Parkway to Cardiff, Barnt Green to Bromsgrove, and Walsall to Rugeley. There is a whole host of places where this is going on.

Our ambition, which I hope we will come on to, is to do a lot more electrification. There are costs to this. There are opportunity costs, because, as this Committee has looked in some detail, there are other technologies. We want to get to that point where transport and rail play a key part in decarbonisation and the Government's overall strategy. There is a lot to be done, and we will do a lot.

Q133 **Sam Tarry:** We have had a lot of written evidence from several organisations highlighting that the old franchising agreements were a key factor that inhibited development of a carbon-free railway. We are shifting from that franchise system, and we have temporary measures at the moment. That is all up for grabs a little and we have the Williams review. As they come to an end, can you make a commitment that you will be a bit more stringent on decarbonisation commitments in whatever shape the settlements finally take?

Chris Heaton-Harris: I have been trying to follow the evidence that the Committee has taken, but I must have missed that element. The reform agenda, bringing track and train together, will help because we will have a clearer strategy, both from the centre and in delivery, in operational terms of how to do this.

We are ambitious. As part of the spending review settlement, we are developing the case for the trans-Pennine route upgrade, including its electrification. We will push quite hard on this agenda, because I think, and the Department thinks, that it helps with both levelling up and decarbonisation—two very key elements in this Government's agenda.

Rachel Maclean: It is really important to put this in the context of the Government's overall agenda on R&D and decarbonisation generally. We all know that rail is a comparatively green method of transport. It is good for freight, and, as your previous witnesses referred to, it gets things off the road, which is good. But we cannot just sit back and say, "Well, it's okay. We will deal with roads, and rail can take care of itself." Rail has to play its part in decarbonisation, and we will see that in the TDP. We will see very clear steps that we will set out where we need to go further in rail, and what Chris has just said will form part of it.

The overall R&D spend that we are putting in as a Government to transport, and the economy generally, will be ramping up massively. We have seen that with announcements from the Prime Minister, we have seen it go further in the 10-point plan, and rail will be part of that—it absolutely has to be—because it has to work as a system. We have to get the skills right across the board and we have to get that innovation flowing through to all bits of the rail industry.

Chair: It is very fitting that I hand over to Simon Jupp, who knows how to broadcast properly. We will talk about electrification.

Q134 **Simon Jupp:** You have many skills, Chair, and broadcasting is certainly one of them. Good morning to the panel. It is very nice to see you.

Network Rail says electrification will cost between £18 billion and £26 billion to deliver its strategy, much of which will be spent on electrifying the network. At the moment, we are facing severe economic pressures. How committed is the DFT to invest in electrification on this huge scale?

Chris Heaton-Harris: Very. I could labour the point—and probably should as a Minister—and tell you how brilliant and ambitious we are. The very simple answer to your question is that we are very committed to electrification.

Q135 **Simon Jupp:** Rachel, would you like to add anything?

Rachel Maclean: Chris has summed it up very succinctly. It is not that we are very committed because we want to be. We have legally binding commitments to do this. We have legislated for net zero. Rail has to play a part in that. Electrification, as we have heard, is a critical factor in that. We are also committed to following the advice of the Climate Change Committee on meeting our carbon budgets, and those set out the interim steps that we must take to get to 2050. We will not get there unless we electrify the trains.

Q136 **Simon Jupp:** An awful lot of people will agree with both of the points you have made about the importance of this commitment. Is this passion and determination absolutely shared by the Treasury, who hold the purse strings?

Chris Heaton-Harris: I believe it is. Electrification, as Rachel has said, is a key part of decarbonisation of our transport network. Decarbonisation is a Government priority to which the whole of Government are fully signed up. Quite rightly, the Treasury wants best value for the taxpayer's buck. The pressure that the Treasury puts on us is genuinely good for the whole of the system because it makes us work harder to deliver that value for money and to get the best business case that we possibly can.

There were questions earlier in this session about the cost per kilometre of electrification. We have a lot to learn from other places, but we also have managed to maintain a supply chain domestically that is learning as it goes along. We can do more to drive costs down. My fellow witness, Mr Luxford, might be able to give you a couple of examples of how that has worked based on costs per mile. The rail industry itself, the RIA—Rail Industry Association—believes it can do better and do these things cheaper as well.

Q137 **Chair:** Do you want to come in, Mr Luxford?

Philip Luxford: Network Rail currently delivers well below the costs that it did in the previous period and the high numbers that we remember from Great Western electrification. The projections that form the basis of TDNS straddle the range of the Rail Industry Association estimates. The lower end of Network Rail's estimates is close to the lower end, and they

are backed up by the delivery that Network Rail is doing right now. They are delivering currently to the sorts of numbers that we need to be able to afford electrification through the next 30 years.

Q138 **Chair:** For the record, what numbers are they?

Philip Luxford: The interim programme business case they published is based on a range of £1 million to £2.5 million per single-track kilometre. That starts slightly higher than the RIA numbers and ends higher than the RIA numbers.

Q139 **Simon Jupp:** You are a very good broadcaster, Huw.

What would be the economic cost of not implementing Network Rail's decarbonisation plans? The cost is rather large in itself, but there is an impact if it is not delivered.

Chris Heaton-Harris: I have not seen figures that quantify the economic cost of not electrifying. Huge chunks of the supply chain would gradually fall away and expertise would be lost. That expertise would go overseas, because this is a growing international market. I have not seen it quantified in any particular way. I have seen at different points of routes where towns and cities are keen to be on an electrified rail system but have not quite got to them and have put together a view of how they would benefit from electrification, but I have not seen anything about economic cost, I am afraid.

Q140 **Simon Jupp:** Understood. Going back a little bit in time to 2017, the former Secretary of State cancelled three electrification projects because they were too expensive. What assurances can you give us that this will not happen again?

Chris Heaton-Harris: I think you will find that the industry has learned many lessons since then. Network Rail, as a delivery partner, has been learning lessons all the way through, and, under its new leadership, is implementing those lessons learned. If you look at the costs of some of the very tough work it has done on the bits of electrification that I mentioned earlier, you see that it has managed to keep them well in line with what it predicted and been able to deliver them pretty much to time. There was one issue with a tunnel somewhere, but we have an interesting network, as Andrew Haines described.

The industry has learned many lessons. We know how to programme better. This is quite a big ambition and the pipeline is probably 30 years-worth of work to get to that end point. I would like to think that there are plenty more lessons to be learned, but I believe the pipeline is ready.

Simon Jupp: It would be remiss of me at this point not to say that the west country would absolutely value being electrified.

Chair: Thank you, Simon. We hear your lobby.

Q141 **Gavin Newlands:** Minister Heaton-Harris, can you give us a cast-iron

guarantee that this £1 billion cut will not affect any electrification or decarbonisation projects?

Chris Heaton-Harris: No, I am not a Minister who gives cast-iron guarantees for anything, so no. As I have said previously, we still have not worked through what this means in our Department's profile of spending. I could not if I wanted to, but I am not a Minister who would do it.

Q142 **Gavin Newlands:** In your first response on electrification, you said that the DFT is extremely committed—indeed, "brilliant" was your word in terms of electrification. Scotland has a significantly better track record, if you pardon the pun, on electrification because a number of the schemes have been cancelled, as my colleague Sam Tarry said. If your scheme is that good, why have there been so many cancellations? I have spoken to a number of bodies within the industry and asked those questions and received a number of private responses. I am not going to share them, but they have indicated their suggestions as to why. Why does Scotland have a better track record? Is it a political will issue?

Chris Heaton-Harris: I am quite sure what you say is completely correct. We work with Network Rail to develop the future electrification schemes through our enhancements pipeline, which ensures that they are deliverable and affordable for the taxpayer. We have a pipeline for the future and we will make announcements in our usual way.

I noted the costs of some of the electrification in Scotland, and they were at the lower end of the numbers that Mr Luxford gave to the Committee. If there are lessons to be learned from Scotland, we will absolutely learn them.

As you know, Mr Newlands, there is a very good exchange of information cross-border on this, and no one wants to deliver schemes that cost more money for the taxpayer. We share the Scottish Government's ambition on electrification, and we have a lot of rail that needs electrifying in England.

Q143 **Gavin Newlands:** I hope that those lessons on decarbonisation are learned. Are there any plans for electrification on the west coast main line?

Chris Heaton-Harris: I will give you the same answer. It is in our ambitions, but it has to go through the pipeline, as with all other plans.

Gavin Newlands: I could ask more, but I believe we are behind so I will leave it there.

Q144 **Chair:** We talked with the previous panel about the fact that the cost of electrification in Germany per single-track kilometre is £450,000, whereas in the UK it is £2 million to £2.5 million. You said you are committed to electrification, but our witnesses in the previous panel seemed to suggest that, where you stop electrification, you put the cost up because you lose the supply chain and the expertise. What impact has

the cancellation of the three electrification projects in 2017 had on cost?

Chris Heaton-Harris: Some of the supply chain did go elsewhere to deliver its projects. On cost, though, we learned from the lessons of that. The Rail Industry Association put in an electrification cost challenge report that identified where we can improve and claimed, at the time the report was delivered, that between a third and a half of the costs in some recent projects could be trimmed, citing examples from ongoing projects in the United Kingdom and international projects. It suggested that simpler electrification projects should cost £750,000 to £1 million per STK, and more complex projects should not cost more than £1.5 million. We have figures, as Mr Luxford gave, that per kilometre at the top of the range it is more like £2.5 million, but the industry is reacting well. We have learned the lessons in a good way of being able to maintain costs at a much lower level and drive them south, not north.

Q145 **Chair:** Andrew Haines from Network Rail seemed to suggest that he could go below £1 million, which is certainly welcome because we will get more electrification. It appears that you are still looking at a window of £1 million to £2.5 million. That still gives the opportunity for more money to be wasted, effectively, if we have such a large parameter to work on.

Chris Heaton-Harris: I would like to think our pipeline process simply would not allow money to be wasted. I completely hear what you are saying, Chair. In just about every conversation that we have on the pipeline of projects, I always ask why things are costing so much, if there is a rail industry premium to them, and what we have learned from overseas that we can bring back.

The industry has challenged itself. The supply chain has gone away, learned a huge amount, and does believe it can deliver electrification for these numbers. We at the centre will continue to drive down these costs as best we can. The whole of the industry—Network Rail, the supply chain, the Department—are completely aligned in doing this. I am very hopeful that we will be able to maintain the downward trajectory of how much this costs per kilometre.

Q146 **Chair:** Does that confidence extend to having a complete cap on that cost per single-track kilometre?

Chris Heaton-Harris: It sounds attractive, but there is bound to be a tunnel somewhere halfway up a train line where that cost is going to be £3 million or £4 million, and you do not want to say, "No, we have a cap so we cannot do that," and blow apart your electrification of one line because of that. There should not be a cap, but there certainly should be a drive to maintain lower costs.

Chair: Let us move on to hydrogen and battery now.

Q147 **Lilian Greenwood:** If you don't mind, Chair, I have a couple of quick questions to slide in before we move on to the next bit.

Minister, I welcome your firm commitment to electrification. You talked

about 30 years' worth of work. When the decarbonisation taskforce was established, the then Rail Minister said there were plans to remove all diesel-only trains from the track by 2040. Is that still the Government's intention?

Chris Heaton-Harris: It is. Different technologies will play different parts in this.

Q148 **Lilian Greenwood:** In response to an earlier question, you said that there has been electrification of the rail network in recent years. We heard from the previous panel that it makes sense to keep those experienced teams together because that helps to keep costs down.

In a previous session, I asked the RIA representative how soon you need a decision on extending, for example, electrification of the midland main line to make that efficient, and he said, "Yesterday." When will we see the electrification rollout continue to ensure that we keep those teams together, keep costs down, and deliver on that commitment?

Chris Heaton-Harris: Fortunately, we are still delivering electrification across our network, and have been in recent times. We have completed almost 700 miles of track electrification in England and Wales in the last three years, which is 15 times more each year than the average of the previous two decades. It is obviously not quick enough, especially for lots of people.

Q149 **Lilian Greenwood:** How do you ensure there is not a gap?

Chris Heaton-Harris: It is the job of the Department and Network Rail in our spending profile going forward to make sure we make the right choices, but we have to get the best value for the taxpayer at the same time. As Andrew Haines described, we are still in the process of working out what the spending review means for this, but we will deliver more electrification. As part of the spending review settlement, we are developing the case for the trans-Pennine route upgrade and other big projects. The supply chain will be quite happy when we come to the end of that work.

Q150 **Lilian Greenwood:** Is there potential for new electrification projects to begin before we get to the next control period?

Chris Heaton-Harris: That is probably more of a technical question, because there is plenty of work done on development. I will ask Philip whether he knows.

Philip Luxford: "Maybe" is the answer. A range of projects are at the pre-initiation stage for the rail network enhancement portfolio. There is development work going on before we take a decision. Some of the projects are elements of de-scoped schemes and, therefore, would be quite rapid to start work on. Hence, it depends. If we take a decision that some of those were included as we conclude that work in the wake of the spending review that Minister Heaton-Harris has set out, depending on

which schemes go in, some would see progress in this control period as in shovels in the ground as opposed to just design work.

The skill base that we are talking about is also the design work skill base. It is not just the people who are out on the network doing the physical works. When we take decisions to move with these projects, we are pushing money into the supply chain quite early, even if it is not the shovel in the ground that we all like to talk about.

Q151 **Lilian Greenwood:** Presumably, in order to keep costs down, you need to keep together the people who are the delivery—the shovels in the ground, the guys who are out late at night when no one is using the rail network—as well as the design folk.

Philip Luxford: Yes.

Q152 **Lilian Greenwood:** Moving on to the alternative technologies, the assumption within Network Rail's strategy is based on technology known today. You heard the discussion we had with the previous panel. How will you ensure that the decarbonisation strategy you implement is able to adapt to the development of new technology and enable innovation while providing that long-term vision that we know is necessary in such a capital-intensive industry?

Chris Heaton-Harris: Hopefully by opening up opportunities for companies. Amazing innovation in this area is already being delivered and we are using it. We have a vibrant rolling stock market in this country, which means that lots of people want to build trains here with bi-modes and others.

I travelled on one of the Greater Anglia Stadlers. In fact, I very luckily sat in the cab before it was properly commissioned. It is a bi-mode fleet with a small power pack vehicle containing a diesel generator that can use power on the routes that are not electrified. It also has—which I thought should not be a massive innovation in the UK but was awesome—a ramp that comes out. Every platform becomes accessible as a result.

The technologies and the bi-modes that are already operating demonstrate that there is a vibrant market in the United Kingdom for these products, and we have purchased a lot of product recently. More and more people are coming here. With HS2 coming forward—sorry, I thought I would stare you in the eye when I said it—and the trans-Pennine route, there are lots more purchasing opportunities where Government train operating companies and Network Rail can come together and help this market move forward.

Q153 **Lilian Greenwood:** Of course, and to maximise use of HS2 you need to electrify more of the conventional lines so that we can have those classic compatibles.

You will have heard the question to the previous panel about batteries: they generate relatively high levels of carbon, there are ethical questions

about how the minerals involved are mined, they are difficult to recycle, and they need to be replaced several times over the lifetime of the train. How serious are those downsides with battery power and how will you address them as part of your plans? Perhaps it is a question for Minister Maclean, as she is the future.

Rachel Maclean: This is an issue that is often raised in connection with batteries, not just for trains but for road vehicles. It is very important that we address those concerns, and that is why the Government set up the Faraday Institution, which is funded with about £374 million. They are developing our own skill set in battery technology. Clearly there are some ethical concerns, although, I have to say that is monitored incredibly closely by the Government because we absolutely do not want to have a supply chain that is in any way compromised.

Sometimes the reporting on this is a bit inaccurate, because we have very stringent controls. Nevertheless, we are committed to investing in the UK to have a supply of batteries that is ethical, renewable, and sustainable. We are working on sustainability and recycling technology for batteries. I am confident that this industry will develop very quickly. We want to have a "gigafactory" in the UK as well. We want to see our own home-grown UK battery industry. It is possible to get lithium and other elements from Cornwall, for example. I think we will see big developments in this whole area, which will enable us to use batteries on trains and road vehicles.

On the broader point, the TDNS said that it is probably practical and makes economic sense to use alternative technologies on about 2,100 single-track kilometres of the rail network, and that will be on the parts that are less intensively used. It is important that we get these technologies right and we invest in them.

Q154 **Chair:** Thank you, Lilian. Greg has indicated that he covered the hydrogen piece in his earlier questioning.

Let us move on to decarbonising freight. We talked about this in the first session, and we have all the way through. I want to make sure that freight has the opportunity as well. Is Gavin Newlands still on the screen? He is not, so I will cover this.

How will you ensure that the plans to decarbonise the railway do not distort the competitiveness of rail freight and cause an inadvertent modal shift to road freight, which would then lead to an increase in the carbon footprint?

Rachel Maclean: It is a very important question. I heard your earlier witnesses talk about it. The broader point is that we need to decarbonise road freight as well. We absolutely do need to look at that. We have announced that we will consult on a phase-out date for HGVs as well as cars and vans. We are doing a lot of work on automated freight and zero-emission automated logistics to tackle some of these broader issues.

We know that rail freight is a low-carbon method of freight. We have a mode shift revenue support scheme, which supports the carriage of freight by rail and water on routes where, in normal times, it would be cheaper to send it by lorry. That is actively supporting the take-up of rail freight. We spent £20 million on that and it was 28% up on the year before. That has helped to remove 900,000 HGVs from the road, which is quite significant.

We have made changes to some of the operating conditions during the covid pandemic to allow Network Rail to run longer and heavier trains that are more efficient and effective for freight. We need to look at things like rail freight hubs as well. There is a lot of work going on to make sure we tackle this.

Chris Heaton-Harris: I am the Member of Parliament for Daventry, which anyone driving up and down the M1 near junction 19 will know contains the Daventry international rail freight terminal. It is the biggest in the country. It is quite amazing when you see a train pull into the Tesco or Sainsbury's rail side and what would have been 44 lorries' worth of containers is taken off. There are some amazing commitments that private sector businesses are making to rail freight.

I think it has a really vibrant future. The last stats that I saw were that the rail freight industry results in about 7 million fewer lorry journeys each year. That is a number that we would very much like to see go up because it is good for overall carbon emissions.

Q155 **Ruth Cadbury:** When I asked the question to the first set of witnesses, they made it very clear in their answers that the Government need to incentivise rail if we are not going to get modal shift from rail back on to the roads. What plans do the Government have to incentivise the decarbonisation of rail freight in the medium to long term in order to prevent that modal shift?

Rachel Maclean: The main way that we do this is through the incentive that we already have, which is the mode shift revenue support scheme, which already removes 900,000 HGVs off the road. We will keep that under review. The work that we are doing in the TDP will look at this broader question and make sure that, as we are decarbonising more broadly, we are not inadvertently creating mode shift anywhere that is unhelpful to our overall goals.

There is a fair bit of work and thought going on in terms of the TDP more generally because it comes into some of the broader questions about place-based decarbonisation and how we encourage things like delivery hubs and last-mile schemes and all of that working together to decarbonise our freight system. It is a whole interconnected system, and we need to consider all aspects of it. You are right that, if we change one part of it and do not consider the knock-on impacts, it could be very unhelpful.

Ruth Cadbury: That is what the witnesses from the rail industry have been saying.

Chair: We will move on to the section on research and development funding and SMEs.

Q156 **Chris Loder:** Do you agree with the rail industry decarbonisation taskforce that funding should be rolled out through a cross-industry research programme?

Rachel Maclean: I am not sure I heard exactly what your question was, but we are rolling out funding across the industry through a variety of methods, because we recognise that the Government have to support early stage innovation where it is not necessarily commercial or where the market or the operators cannot.

For example, we have spent £57 million over six years across the whole industry for R&D. We have spent £47 million on rail innovation competitions, which are to be delivered by Innovate UK. Network Rail has its own programme for CP6, which is worth £245 million.

There are some really fantastic examples of things that have come out of some of those competitions—amazing innovations that are starting to be looked at and rolled out and informing the industry has a whole. The R&D piece has a really exciting future.

Q157 **Chris Loder:** Minister Heaton-Harris, with us coming out of the European Union, are there opportunities for rules and regulations that have been mandated through the EU to be reviewed or reassessed that would help our many procurement processes and other things to reduce costs for us in the UK?

Chris Heaton-Harris: Certainly, there is a push from industry about the procurement piece. As a former Member of the European Parliament who was sitting when one of the procurement directors—I cannot remember which one—was rattling through the system, you can see why, as a seller, you might want the procurement process to be different.

We are looking across the Department at the opportunities that present from leaving the European Union and what that might mean. It has taken a bit of a back seat in recent months because these are the people who are working on covid response in our Department at this point in time, but I hope we come back to it.

Rachel is leading for the Department on the exit. On research and development and for support and procurement, it is a piece of work that we will do in the future.

Q158 **Grahame Morris:** Minister Heaton-Harris, you touched on this a little earlier. Regarding procurement processes, it must be very tempting to go for off-the-shelf solutions. If we are greening the economy and decarbonising rail and transport more generally, I am sure we all want to

maximise the potential for UK-based employment, particularly for small and medium-sized enterprises.

You might know, Minister, that I am a keen fan of some of the existing developments, including the rapid self-charging battery trains. They have enormous potential. They are made in the UK and are very innovative. Is it your view that procurement processes should be adapted to try to better support UK-based SMEs?

Chris Heaton-Harris: Network Rail has a very strong track record of procuring British goods, and that includes steel. It is excellent at procuring British steel. There are amazing innovations. In 2017, the Department awarded Vivarail—which I know we have talked about in the past—£400,000 to develop the innovative rapid charging and static electric storage technology for battery trains.

Other key partners of the Department are using relatively small sums of money to do some quite interesting research and development for us. That demonstrates that we have been quite slick in our procurement in the past and that we can only get better at procuring going forward.

Q159 **Grahame Morris:** I want to ask a question about improving accessibility in the passenger experience. Chris, in one of your earlier answers, you mentioned some of your own experiences of how this is improving. Should we not be using this opportunity of the new investment to improve the passenger experience? We are all concerned about access for all—how we can make the railways and passenger trains more attractive—and that includes for people who are involved in active travel, walking and cycling and so on, particularly for people with disabilities. There are issues about unmanned stations and levels and so on. I know there were some delays to the initial commitments to make every train accessible by the end of 2019, but are we going to press ahead and make sure all trains are compliant?

Chris Heaton-Harris: Yes, very much so. I know you have a passion for this, Grahame. I am the Minister in charge of accessibility for the Department.

Innovation really does help. I say that because I am super-impressed by such a simple idea that I saw being used a lot when I used to work on the continent. The ramp extending from a train on the Greater Anglia network means that previously inaccessible stations are accessible without the need for a person to be there at all. On that network, it is a game changer, allowing people to travel with independence.

There is so much we can do in the field of innovation. We are changing our rolling stock so dramatically with big procurements, and it is all accessible. The last Pacer was removed from the northern network only a couple of weeks ago. Big improvements are being made. They have been programmed for quite some time. I am fortunate that I am the Minister at the time when they are being delivered.

Grahame Morris: Chair, I know we are short of time, so I am going to hand back to you to finish off the last sections on franchising and the Williams review.

Q160 **Chair:** We have actually got the Ministers until midday.

Touching on accessibility, the rail industry had 10 years—the end of that was 2019—to meet its target to provide accessible trains for every passenger and failed to do so. Are all trains compliant?

Chris Heaton-Harris: There are still some trains that are not compliant. I am the Minister that has to sign off any extensions to that, and the train operating companies and rolling stock companies know my view on whether I am going to sign off things in the future.

Chair: You have not quite given it, but it sounds as if we would applaud that view as well. Chris, did you want to come back on SMEs or had you finished your line of questioning?

Q161 **Chris Loder:** If we have time, I would like to ask about the procurement process and the EU rules I mentioned earlier. What specific actions are we taking to help, support and give opportunities to small and medium-sized businesses across the UK to participate and to actively contribute to our mission ahead?

Rachel Maclean: It is a really important question. I have been focused on it from a personal perspective because I started and ran an SME for nearly 30 years before I came into Parliament. I know from being in that community how difficult it is to pitch into and get contracts or get any traction on a commercial level with large organisations, be it corporates or something like Network Rail.

I have therefore taken a very close interest in this. We have a number of programmes in the Department. It is fair to say there is a lot more we can do. I have been pushing the various officials in charge of it to do more.

There are two strands to this. First of all, it is about levelling up that very important agenda. At the moment, I feel the system is a little bit stacked towards some of the SMEs or start-ups that already are in a system where they are quite well funded, are within a university system or within a town or a place like Oxford or Cambridge and have lots of contacts. It is not so easy for people outside of that to get on to the radar or even enter these competitions. I have been pushing Innovate UK to do more and reach out more, and I will keep doing that. I believe we can go further. I hear often from people in the community that they struggle to even get their foot in the door. We have to do a lot more on that.

We have some really good programmes. T-TRIG gives grants of 100% to small, innovate start-ups, and some of them have gone on to much greater things, scale greater heights, and start to make a big impact. We will have more freedom when we are outside of the EU to do a lot of this

differently. In terms of the detail of it, we are still working through that at this point because we have not reached the final shape of that EU agreement that we very much hope to get to.

Q162 **Chris Loder:** As part of that, will the Government review and/or stop the approved suppliers and providers of services approach that has been mandated through those rules and regulations? That is ultimately the blocker for many small businesses that cannot afford to go through the bureaucracy to meet those compliance requirements in order to access the market.

Chris Heaton-Harris: I honestly do not know the answer to that question, Chris. There is a lot of work going on in a different Department about how small businesses can access Government contracts easier. I would assume that BEIS is looking at it.

Q163 **Chair:** In the last section, we want to look into the future of rail, so we may broaden up a bit. I want to ask about the Williams review and franchising. In March, your Department released the "Decarbonising transport: setting the challenge" document, which is very ambitious. One of the ambitions was to have the transport decarbonisation plan published by the end of autumn. When is that likely to be published?

Rachel Maclean: I made the commitment to the Committee that it would be published this year. However, it is now the case that we will look to publish that next year, and, when we do that, we will be able to make it an improved document because we will have been able to take into account not only the spending review but the impacts of the Prime Minister's 10-point plan that he announced a couple of weeks ago across the broader build back better agenda, and also the advice of the Climate Change Committee, who reported yesterday on the sixth carbon budget. We want to include all of that so that we have a comprehensive document, and that will be published early next year.

Q164 **Chair:** Early next year? I will push you, because there could be further announcements and it will mean it is in the wait-and-hold mode. When would you expect it to be published? By the end of spring?

Rachel Maclean: I want to be clear with the Committee that, as I said before, the work has been continuing. We have had to move some people to deal with emergency pandemic responses, and that takes a lot of staff and resource. But we are absolutely committed to this because we know that time is ticking on. Every month or year that we delay is a month that we have lost in putting the foundations into place. I will not give a cast-iron guarantee. Chris is right on that. I am absolutely committed to getting this published early next year, and I will strain every sinew to do it.

Q165 **Chair:** Something else that has been in the wait-and-hold mode is the Williams review. It is very relevant to this topic of decarbonisation because the type of rail industry network we have will very much play its part in the ability to then decarbonise and think in the long term.

Minister, do you have an update for us on the Williams review?

Chris Heaton-Harris: In my last Committee session, I said it would be out within two months, and that was about three weeks ago. It will be out, all being well, within the next six weeks.

Q166 **Chair:** That is encouraging. How will the future contractual arrangements that may result from the Williams reforms and the wider reforms encourage decarbonisation of the railway and improve the overall passenger experience?

Chris Heaton-Harris: The point of them is to bring track and train together so we can make wiser decisions for the whole network. Keith Williams, I am sure, would tell you himself that he believes that that would make decisions over the sorts of things that we have been talking about today much smoother, much quicker, a bit slicker, maybe help with the research and development going forward, and industry will be able to concentrate on delivering good services for the passenger at the same time.

Chair: We look forward to both the report being published and how that will help the decarbonisation agenda.

Q167 **Ruth Cadbury:** I want to pick up on the passenger experience and Grahame Morris's point about disability access. With regard to Access for All, I am very concerned that allocated funding for some of our local stations may not be spent because South Western Railway is saying that, because of the short-term contract that it has, it might not be able to implement the scheme—there is some uncertainty—and this disjoint between the various parts of the rail system causes concern. With regard to stations and the area around stations, how can you, as Ministers and the Government, encourage low-carbon access to stations as part of the overall decarbonisation of rail, making it easier for low carbon and active travel methods to have priority in and around stations?

There is also the ongoing irritation about storage for cycles on trains. We will not get people out of cars and on to trains if access is difficult, whether they are coming by active travel or they need level access.

Rachel Maclean: Chris and I are looking at each other because we share responsibility for some of this. I will make some comments and I will let Chris come in.

It is a really important point about access to stations and the role that stations play in the system as a whole, and, therefore, the role that it plays in decarbonising the entire sector. As part of our plan, we are looking at what we call place-based solutions, which means looking at what will work in a local area and being more innovative and allowing more solutions to emerge. That is around, for example, shared mobility and mobilities of service. We are looking at e-scooters very actively at the moment, and the whole active travel piece plays into that.

We know that different things work in different areas, and we want to enable and support those local areas to bring forward those solutions. We are trialling a lot of them across the country. We have a number of future transport zones up and running, learning from what works really well in those areas, and we can support local authorities to roll those out more widely. I will let Chris talk about the bike storage side of things.

Chris Heaton-Harris: On the South Western Railway point, I have not heard that, Ruth. Would you mind sharing some details with me?

Ruth Cadbury: You are about to get a letter from me.

Chris Heaton-Harris: I will chase that up. There should be no reason whatsoever why that is the case. I will go away and find out more.

One of the best black tie events I have been to was the Cycle Rail Awards dinner where I presented prizes to the best projects—and they were truly innovative prizes. When we were allowed to do visits, I went up to Hull to see an investment in a new cycle storage place at the station. I am now one of the very few people on the planet who, when they go to a railway station, go and check what the cycle storage looks like. It is improving, and we are investing in this to make sure it does.

Lots of the new rolling stock has better provision for cycles, and I am very hopeful that, in the future, technology will be able to tell cyclists where they can get a bike on a train, where to stand, what they need to do, and if they need to book ahead. I know some of this exists already, but it has to be uniform across the whole system and just that bit slicker for everyone. There are so many innovative products in this area. It is quite remarkable. It is a very exciting time for the active travel portfolio in the Department.

Chair: I thank both Ministers very much indeed. There are 15,400 single-track kilometres of rail to be decarbonised. There are clearly choices there, and there are implications for the taxpayer as well. We are very much looking forward to writing our report and issuing our recommendations. Thank you, Minister Maclean, for the e-scooters response. You have accepted in part or in whole all the recommendations we have made.

Hopefully, we will get the same again in our next report. You have described yourselves as the ghosts of past, present, and future. We will not ask you who you have been visiting in terms of where Scrooge lives. That would be unfair seeing as you have given us such good evidence. We very much hope that No. 10 and No. 11 will support your endeavours in this field as well. Thanks to you both.