Infrastructure for zero emission heavy goods vehicles and coaches

Personal details

1. What is your name?

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3 Are you responding on behalf of an organisation? *

✓ Yes

☐ No (Go to 'Call for evidence: what we are asking for')

Organisation details

4. What is the name of your organisation?

England's Economic Heartland, Transport East and Transport for the South East

We are asking the primary location of your organisation within:

- the regions of either the United Kingdom

  Wider South East of England

- the regions of either the European Union
- the regions of either the European Free Trade Association [opens in a new window]
  another location

5. What best describes where your organisation is based?

✓ United Kingdom

☐ European Union

☐ European Free Trade Association

☐ Other:

6. What best describes your organisational type?

- [ ] Freight transport trade association
- [ ] Coach industry trade association
- [ ] Other trade association
- [ ] Road freight operator
- [ ] Cross-modal freight operator
- [ ] Non-road modal freight operator
- [ ] Third-party logistics provider
- [ ] Fourth-party logistics provider
- [ ] Coach operator
- [ ] Vehicle manufacturer
- [ ] Local government body
- [x] Regional government body
- [ ] Research body
- [ ] Academic body
- [ ] Another type of organisation:

7. How many employees are in your organisation?

- [ ] 1 to 9 employees
- [x] 10 to 49 employees
- [ ] 50 to 249 employees
- [ ] 250 to 499 employees
- [ ] 500 to 1,000 employees
- [ ] Above 1,000 employees:

This is a combined figure for all three STBs

Introduction

The Sub-National Transport Bodies of England's Economic Heartland (EEH), Transport East (TE) and Transport for the South East (TfSE) welcome this inquiry by the DfT to find out more about our understanding of what is required to support the development of a zero emission HGV and coach infrastructure strategy for the UK, for both public and private providers and to inform future decision-making about zero emission HGVs and coaches. We trust that our response to the questions posed below will provide value to the DfT in enacting future policy and action plans.

This is a draft officer response that will be presented to our respective boards in early 2024. A further iteration may therefore follow.

All three organisations are sub-national transport bodies (STBs) and represent 58 local authorities, businesses and transport sectors from across the wider South East of England to speak with one voice on our areas strategic transport needs. Since their inception, they have each emerged as powerful and effective partnerships for their regions and all produced 25–30 year transport strategies which will shape government decisions about where, when and how to invest in our regions to 2050.

Each STB has produced a series of strategic investment or action plans which act as blueprints for investment in each of our areas, shows how we will achieve our ambitions, are owned and delivered in partnership with local and national government and the private sector; are regional plans with evidenced support to which partners can link their own local strategies and plans – a golden thread that connects policy at all levels. Each provides a sequenced plan of multi-modal investment packages that are place based and outcome focused and examines carbon emissions impacts as well as funding and financing options.

We have each also produced either freight strategies or action plans which will:

- Enable sustainable freight and logistics sector & economic growth in our areas
- Support the safe, reliable & efficient movement of goods
- Minimise air pollution and carbon emissions
- Provide a framework for infrastructure investment decisions and key areas for collaboration and innovation
- Act as a vehicle to develop buy-in from all sectors of the industry and ensure its vision is delivered.

Questions 8 – 12 are for HGV operators to answer only.

13. What is needed from infrastructure across the UK to support the adoption of zero emission HGVs in the UK, in and out of mainland Europe and Ireland?

in the UK?

in and out of mainland Europe?

on the island of Ireland?

We believe that a national strategy would be beneficial for all levels of government and the private sector to establish locations for charging and hydrogen refuelling at minimum distances along the strategic and major road networks, and in or around major urban areas. In terms of rollout, we would also recommend that all the locations are identified and established as early as possible, i.e. between now and 2030, although we recognise that there will be a lower capacity to begin with, and room to add additional chargers and/or hydrogen refuelling as the numbers of zero emission vehicles increases. Having good coverage of sites early on, albeit with less capacity at each and room to expand, will be more helpful than having fewer high-capacity locations early on and adding locations later.

As a rule, fast charging stations suitable for HGVs should be available every 40 miles on key freight corridors. These should be capable of 350kW charging and should be backed up with additional

charging stations at slightly wider intervals on the broader strategic and major road network, plus charging stations in or on the periphery of all the major urban centres.

Hydrogen refuelling stations can be more widely spaced, at intervals of around 100-150 miles on key freight corridors. Again, these should be complemented by additional stations at wider intervals on the wider strategic and major road network, and at main urban centres. In most cases hydrogen stations can be co-located with a subset of charging stations, and to begin we would recommend identifying sites for hydrogen and setting aside space on the site, even if demand is not sufficient to actually install a hydrogen station, so that the network is effectively 'hydrogen-ready' at such time as demand grows sufficiently to support the commercial installation of refuelling stations around the network.

There is a clear case for whatever charging and hydrogen refuelling policies that are adopted by the UK to mesh seamlessly with those adopted by our foreign trading partners. This clearly makes sense from the point of view of foreign HGVs and coaches operating in the UK. It is also important to recognise that most HGVs and coaches in the UK are built to common European and other global specifications by companies selling across the international market, and so their fuel type and range will be the same as those used in the UK. It would be better therefore to create an infrastructure and types of facility that can be used by all vehicles whether built in the UK, Europe or in other international countries.

As STBs EEH, TfSE and TE have all carried out analysis of the freight network in our respective areas. Therefore, we are well placed to co-ordinate and inform more detailed proposals for the siting of specific infrastructure to fulfil the broad objectives outlined above. Furthermore, we are all involved in the national rollout of the tool developed by Cenex on behalf of Midlands Connect, which allows the identification, prioritisation and detailed assessment of the suitability of individual proposed locations for charging/fuelling infrastructure. A mapping tool will also be available from March/April 2024 for this project which can then be used to access and share existing and potential recharging and refuelling locations via the internet. This could then also be further developed, in conjunction with Transport for the North and Midlands Connect, to develop a local freight tool for our areas identifying refuelling, recharging, parking and modal interchange hubs, at a strategic, regional and local level.

14. Who should provide this infrastructure?

The private sector should provide charge points and hydrogen stations. However, there is also a role for government at local, regional/sub-national and national level in strategic planning of land use and the development of electricity production and distribution infrastructure. There is also a role for national government to ensure that National Highways provide adequate facilities on the Strategic Road Network (SRN).

The supply of energy to vehicles is a challenging business to make profitable and requires a bespoke skill set[1]. The private sector can build and operate the private charge points and hydrogen dispensing stations, in much the same way that petrol forecourts do today, though with different levels of technology readiness, cost, and planning approvals for each technology. In our experience of working

[1] https://www.thetimes.co.uk/article/three-in-four-petrol-stations-have-vanished-since-seventies-ldqjzbmfk#:~:text=More%20than%20three%20in%20four,travel%20further%20to%20fill%20up.

with local authorities they have no appetite to become involved in the commercial supply of electricity or hydrogen.

On the other hand, there is a much broader issue on the provision of regional and national infrastructure to support these technologies, specifically electricity grid capacity. It is likely that both technologies, battery electric vehicles and green hydrogen, will be competing for electrical power with steadily growing demand from electrified domestic and industrial heating. The provision of new power generation, and the upgrading of national and regional power and fuel supply infrastructure at this scale, will push the limits of private enterprise. There is therefore a role for government at all levels to facilitate the rollout of charging/refuelling infrastructure both in terms of land use planning guidance and the upgrading of the electricity grid both in terms of generation and distribution of power.

At a regional level, there is a clear role for facilitating strategic data sharing, planning and coordination between local authorities, and between local and national government to support the private sector. As currently constituted, STBs such as ourselves can formulate strategic plans to propose to local government, but we currently hold no regulatory powers to direct local or national delivery bodies to implement them.

Another area where strategic guidance at a regional level will be important is the provision of truck (and coach) stops/facilities. It is recognised that the UK has a desperate need to improve facilities for professional drivers[2]. All levels of government need to work together with private sector developers to identify suitable sites for improved facilities if drivers are to be retained in the workforce and sufficient electrical grid infrastructure is available so that recharging/refuelling infrastructure could be supplied in the same places. However, guidance is required from national government to facilitate this.

15. What implications do you foresee the transition to zero emission HGVs having on existing HGV operations?

The term 'HGV' covers a very wide range of vehicles and operations, especially given that in the UK the term HGV includes everything from 3.5t upwards. Therefore 'HGV operations' captures everything from international trunking (the practice of making deliveries using a regular route) to last mile delivery, from refuse collection to construction. A detailed review of the possible impacts on all of these is not for STBs to provide, but some comments are provided below on 'general haulage', i.e. the movement of non-specialist goods.

Most companies in the freight industry operate on low margins, and for this reason they tend to be conservative in making changes to their operations. In many cases they use contracts that include an adjustment for fuel price. This means that if they continue to use diesel, their margins are protected from fuel price fluctuations, but if they switch to another vehicle technology altogether and get the pricing wrong, they could go out of business. Changes to operational models are similarly high risk. That said, as vehicle technology and costs change, more and more operators will see the technical and economic advantages of making changes, and in any case, their customers are also increasingly demanding that they move to lower emission vehicles as a condition of retaining business.

[2] https://www.gov.uk/government/topical-events/hgv-driver-shortage-uk-government-response/about

One possible change to general haulage is an increase in relay operations. This is where goods are taken partway on their journey by one truck, dropped off and picked up by another truck for the rest of the journey. Pallet networks already facilitate this type of operation for smaller consignments of goods – a regionally based haulier will collect multiple pallets of goods from different suppliers in their area, then take them to a central cross-docking location. Overnight, the different consignments from multiple regions are then reorganised, and the truck returns in the morning to its 'home' region with pallets from other regions to deliver.

Relays are not usually used for single loads that fill a truck, or for containers, because the handling element of changing from one truck to another adds time and cost. It is generally cheaper and more efficient for one truck to do the entire journey, but for longer trips this often results in the driver being away from their home base for several days, sometimes picking up a new load at each destination and then travelling to another part of the country before finally returning home (a type of operation known as 'tramping').

The adoption of electric HGVs, and to a lesser extent hydrogen, will make back-to-base operation more financially attractive, as recharging or refuelling at depots may be significantly cheaper than using public or destination infrastructure. On its own this cost might not be enough to offset the additional handling and transactional costs of relaying, but there are three other factors that may also push operators towards relaying:

1. Driver retention – younger drivers coming into the workforce are more reluctant to stay away from home and family overnight, so relay operators may find recruiting and retaining drivers easier in a competitive labour market[3].
2. Automation – for some types of loads, new technology for handling and/or tracking may lower the costs associated with transferring a load from one vehicle to another.
3. Mode shift – moving freight by rail (and in some cases ship/barge) is a form of relay operation, and this is happening already.

Should relay operations become more commonplace, it may be of benefit to have strategic and regional planning of sites where handover of goods can occur. This should also be an additional consideration in those plans for providing a more co-ordinated network of truck stops with appropriate driver facilities, combining driver facilities and charging/refuelling, as discussed in question 13.

At our recent Wider South East freight forum there was also a call for more national government guidance about the future direction for alternative fuels. Some representative groups of operators expressed the need for more certainty about fuel technology and infrastructure to support their organisations shift to alternative fuels. Smaller operators operate a short rather than term basis so there needs to some form incentive, from national government, to encourage them to make the change.

[3] https://www.researchgate.net/publication/331248339_RELAY_TRUCKING_IN_LOGISTICS

16. What behavioural changes might be needed to accommodate the transition to zero emissions?

Please refer to our answer to Question 14.

17. What role will transitional technologies (such as low carbon fuels, plug-in hybrid vehicles, hydrogen combustion) play as the UK's fleet shifts to fully zero emission HGVs?

Transitional technologies will have an important role to play throughout the shift to fully zero emission HGVs. In the last two or three years, progress in developing battery electric trucks, even in the heaviest weight categories, has been faster than expected, and as a result it is tempting to think that other approaches will prove unnecessary. However, the early adopters of battery electric technology are those operations that might be considered 'low hanging fruit' – i.e. large fleets with back-to-base operations and consistent, shorter daily mileage.

As the transition to zero emissions continues, it will need to encompass operations that will find the shift more challenging, and a variety of solutions will undoubtedly be required. Furthermore, solutions such as a drop-in biofuels[4] (suitably certified) that can achieve immediate greenhouse gas (GHG) reductions are to be encouraged because emissions cuts made in the short term provide more time for the harder cuts to be made later.

In the table below we summarise the key transition technologies, what we forecast their role to be, their limitations, their infrastructure implications, and the role of government in enabling them.

[4] Those fuels that can be used in existing petrol or diesel fuelled vehicles.

Fuel/technology	Role in transition	Limitations	Infrastructure implications	Government role
FAME (Fatty Acid Methyl Esther, standard biodiesel)	System wide GHG reduction via Renewable Transport Fuel Obligation and increasing blend – near term	Feedstock supply (Used Cooking Oil is internationally traded, other countries increasingly wanting to decarbonise will want to buy), and blend wall	None (big advantage)	Maintain robust sustainability standards to ensure their credibility
HVO (Hydrogenated Vegetable Oil, or drop in biodiesel, often called renewable diesel)	Provides an option for fleets to immediately make deep GHG cuts without new vehicles	Supply, both limited feedstock as for FAME and limited production facilities though demand is prompting more investment; higher cost than diesel	None, although it might be desirable as the transition progresses to see 100% HVO pumps at some public refuelling stations	Maintain robust sustainability standards to ensure their credibility; provide additional incentives to encourage fleets to adopt and make sure UK wins supply in international markets
Biomethane	Good halfway house to electric, immediately available, very good GHG savings, quieter cleaner vehicles than diesel. Also, attractive economics of competing with diesel is encouraging investment in production of biomethane, which can then be used more for heating later in the transition. Later in transition biomethane refuelling infrastructure may be repurposed for HYDROGEN	Ultimately feedstock supply (but still plenty of room to expand at this point), will only have a transitional role as trucks still ICE (albeit cleaner), trucks higher cap cost	Currently relatively limited but expanding rapidly with significant private investment. Makes use of existing gas grid. At least part of that investment could be repurposed for HYDROGEN later in the transition	Maintain investor confidence by providing policy stability in terms of fuel duty, sustainability standards, grid delivery mechanism; support development of AD industry through mandated food waste collection and other measures (this is a 'no regrets' policy as biomethane in the gas grid will be hugely useful for hard-to-electrify gas users); regional role to engage with

				refuelling station developers to identify key sites
Plug-in-hybrid trucks	Would/will allow some move to electric miles for operators that can't go fully electric (or hydrogen) in the near term; allow electric operation in urban areas with great benefit to Air Quality (AQ); will allow vehicles with varied use patterns to do many journeys 100% electric, while allowing operators peace of mind for the occasional longer journeys	Currently not offered by many manufacturers, not clear if this is for technical reasons or because the technology has a poor image. (Tevva is only manufacturer known to be offering a range extender, and it is a hydrogen fuel cell.) However, in the car market the dynamic has been that early adopters prefer 100% electric but as the market matures later adopters are more pragmatic and value the compromise – this may well be repeated for trucks	Will use whatever charging infrastructure is available (likely primarily at depot), but has the advantage of not being dependent on it; for the range extender, as for whichever fuel is used	Policies to ensure that users plug in as often as possible would help to rehabilitate the image of plug-in hybrids and make them more acceptable which would be helpful (although in the case of commercial vehicles, users would be likely to plug in as often as possible anyway to make the greatest cost savings); make sure the regulations for the homologation of truck drivetrains actually allow for the homologation of a range extender engine, currently they make this very difficult for heavy vehicles
HYDROGEN combustion engines	Being developed for specialist sectors like off-road mobile machinery (construction, mining, agriculture) with long hours at high load in challenging environments, where H2FC may be either not robust enough and/or far too expensive to be economic. Not clear if this is a solution for the zero-emission	Still under development, efficiency and NOx emissions may be a problem but these are for the technology developers to solve, will require source of HYDROGEN	This likely to be the main issue/cost for users, given the target market will require on-site HYDROGEN refuelling, sometimes in challenging settings, so in most cases this will be some sort of mobile containerised HYDROGEN station. Will also require a suitable supply chain for green hydrogen by (as for H2FC)	As noted above, it is not clear if this is a solution for the transition, or a post 2035/2040 solution. Biggest benefit might be post 2035/2040 when other options like HVO not available, so govt needs to take a position urgently on whether this will be allowed, and for what classes of vehicles

	transition, or a long-term solution. As this is still a combustion engine, during the transition it will be much easier for operators of this machinery to switch to HVO for example			

Others:

Non-drop-in biofuels – there are some fuels such as biomethanol and bioLPG that are made from biomass feedstocks and also require different engines and/or refuelling infrastructure to petrol and diesel. These do not have the advantage of being 'drop-in' replacements for petrol and diesel, and they will also compete with other uses for the feedstock, so while it is not necessary to ban them, it does not make sense to promote them either. They are more likely to find a profitable market outside the road transport space – bioLPG in heating (and also a small market for existing LPG vehicles) and biomethanol in shipping, for example.

e-fuels – these fuels, otherwise known in some cases as synthetic fuels, are made using hydrogen combined with a source of carbon, to make a hydrocarbon. In order for these fuels to achieve emissions savings the hydrogen must be made with renewable electricity, and the source of carbon must be biogenic or captured from the air. As a result they require far more energy input than using electricity directly, or using hydrogen, and if they use a biogenic carbon source then this is limited as for biofuels. If captured carbon is used, then any sustainability assessment should include a comparison with simply sequestering that carbon rather than burning it in a fuel. Overall efficiency means that these fuels look unlikely to play any significant role in the transition.

18. Based on your knowledge of current operations, what proportion of zero emission HGV hydrogen refuelling do you estimate will take place at the following locations, and why?

Based on present trends, it seems likely that most hydrogen refuelling will take place at infrastructure that can be shared among multiple fleets. This is because (a) the capital cost of hydrogen infrastructure is comparatively high, and (b) the number of hydrogen vehicles looks set to be relatively low, at least in the short to medium term. It should also be noted that compared to electric recharging, hydrogen refuelling is usually a quick operation, so using shared infrastructure is possible in the same way as using shared liquid refuelling infrastructure is currently the norm.

For the short to medium term at least, hydrogen will remain a relatively expensive option, and so will be a choice for vehicles that must cover long distances. These vehicles are by definition likely to be using the strategic road network, so refuelling stations at key locations around that network are a sensible choice.

Similarly, transport hubs that have high through traffic for freight vehicles travelling long distances, i.e. ports, airports and rail interchanges, are likely to be good locations (though not as good as lorry stops). Many of these locations, especially ports, may have relatively small grid connections as well, so hydrogen refuelling may be favoured over high power recharging. Ports may also have access to hydrogen brought in by ship, likely as ammonia, which is also a benefit. For example, Felixstowe is investing in hydrogen fuelling for its site vehicles, and there is ongoing work investigating the possibility of hydrogen production in the East linked to nuclear power and offshore wind.

a. depots: 5%

b. destinations (for example, warehouses, distribution centres): 5%

c. public locations (for example, motorway service areas, trunk road (A-road) service areas, truck stops): 60%

d. transport hubs (for example, ports, airports, rail freight terminals): 30%

e. other locations (please specify) n/a

19. Based on your knowledge of current operations, what proportion of zero-emission HGV recharging do you estimate will take place at the following locations, and why (add detail, where available, on the expected power requirement for charge points at each location)?

Based on current trends, it seems likely that most operators of electric HGVs will favour recharging at their depots wherever possible. This is because (a) operators will be able to negotiate a significantly lower price for electricity on their own sites than they would pay at a public rapid recharging facility, and (b) wherever possible charging vehicles when they are parked up overnight is going to be more convenient and more reliable than finding a public charger, that is not in use already, at the right time and right place.

Destinations such as warehouses and distribution centres may also present a good opportunity for charging, but this is not yet clear. There could be a role for local authorities and regional authorities in engaging with stakeholders in this sector to establish the way vehicles interact with these sites, and the potential for installing charging and onsite power generation.

Public locations, mainly truck stops with driver facilities, will be vital locations for (ultra)rapid charging away from base, and helping to make sure these are strategically located is a role for government at all levels. However, the total percentage of charging that will take place at these locations will be limited by the physical capacity of these sites, combined with the fact that they will only be used by operators where necessary due to the factors noted above. It should be noted that although the amount of charging at these locations is likely to be low as a percentage of the total, this still translates into huge demand in absolute terms, given the difference in time taken to charge vs filling up with diesel. Furthermore, even if an operator is mainly charging in their own depot, they will need to be very confident that they can access charging at public locations should they need it, or they will be unlikely to take the risk of moving to an electric truck.

Transport hubs will carry out a smaller overall proportion of charging as they see fewer vehicles anyway, and as noted above are often grid constrained.

There could be a role for local authorities and regional authorities in engaging with the warehousing and distribution centres, local planning and transport authorities and public operators to identify the potential for installing charging and onsite power generation at public and privately operated sites. As said in our response to Question 13, Midlands Connect and all the other STBs are already working together to analyse and map current and potential HGV alternative fuel recharging and refuelling sites in their areas and are also supporting local authorities in rolling out their own car and van electric vehicle charging infrastructure strategies.

a. depots: 50%

b. destinations (for example, warehouses, distribution centres): 20%

c. public locations (for example, motorway service areas, trunk road (A-road) service areas, truck stops): 20%

d. transport hubs (for example, ports, airports, rail freight terminals): 10%

e. other locations (please specify) n/a

20. What do you consider to be the barriers to installing and accessing hydrogen refuelling infrastructure for zero emission HGVs at the following locations (be clear if you are referring specifically to barriers in rural or urban locations)?

a. Depots – Mainly capital cost, some health & safety constraints. Only the largest fleets will be able to afford the infrastructure and/or facilities.

b. Destinations – As for depots, but there may be a case for hydrogen refuelling in some destinations if they receive large numbers of vehicles travelling long distances.

c. Public locations – More attractive due to large potential market. Key limitation may be the method of hydrogen supply. Onsite electrolysis will be limited at a lot of sites due to grid connection, but where sites have very high capacity installed to allow for use of rapid chargers, likely.

d. Transport hubs – Grid connection likely to be a constraint for onsite electrolysis in many cases, but supply of hydrogen via ship or train may make these ideal sites.

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e. Other - there are likely to be planning issues for freight and logistics, lorry parking operators and distribution network operators wishing to install more hydrogen refuelling facilities in public locations or to expand facilities at their own existing locations. This will be due primarily to a shortage of land because of greater land values attached to land used for other purposes such as housing or business space and the difficulty in getting planning permission for these types of land uses. This could also extend to safety concerns from members of the public regarding hydrogen facilities. The cost of using the specific lorry parking and driver facilities may also deter drivers from using public facilities.

21. What do you consider to be the barriers to installing and accessing recharging infrastructure for zero emission HGVs at the following locations (be clear if you are referring specifically to barriers in rural or urban locations)?

a. Depots – Capital cost, space – it is difficult to work out a plan for all vehicles to be parked next to a charger overnight) and grid connection capacity.

b. Destinations – Primary issue is aligning the incentives for the stakeholders, with landowners, site developers, site operators and vehicle operators often being different. Also issues around understanding the way that vehicles actually use the site operationally.

c. Public locations – Grid connection is primary issue, though in many cases there is good overlap between the high voltage transmission network and the strategic road network, and this should be exploited wherever possible. Land availability is also a key issue, as vehicle dwell times are much longer for charging than refuelling, so the current sites of petrol stations will need to expand to accommodate charging, and this often may not be possible.

d. Transport hubs – Grid connection, and issues as for destinations.

e. Other – similarly to the barriers for hydrogen refuelling facilities, there may planning issues for freight and logistics, lorry parking operators and distribution network operators wishing to install more electric recharging facilities in public locations or to expand their own facilities at existing locations because of greater land values attached to land used for other purposes such as housing or business space and the difficulty in getting planning permission for these types of land uses. The cost of using the specific lorry parking and driver facilities may also deter drivers from using public facilities.

22. Do you think that members of the HGV sector could benefit from working together to support their transition to zero emission, particularly in terms of infrastructure?

Yes, although the opportunities for collaboration may be limited, and it is more likely for hydrogen infrastructure than for charging.

With charging at depots likely to be favoured, for the reasons noted above, most operators are unlikely to want third parties coming onto their sites. An exception is likely to be subcontractors, in which case there is an obvious benefit to the larger operator to provide charging to their

subcontractors, and indeed this may be vital if the long tail of smaller HGV operators are to switch to zero emissions trucks.

In the case of hydrogen refuelling infrastructure, collaboration is more likely as it will be more advantageous to pool demand and share the capital cost of a station. Since hydrogen refuelling is quick compared to recharging, there is also less concern about having to wait to use the infrastructure. However, this collaboration is still unlikely to see operators sharing sites – more probable is a station operator getting agreement from two or three large anchor customers in order to make an investment case.

23. How do you think that members of the HGV sector could benefit from working together to support their transition to zero emission, particularly in terms of infrastructure?

Please see our response to Question 22 above.

Questions 24 – 29 are for coach fleet operators only.

30. Based on your knowledge of current operations, what proportion of zero emission coach hydrogen refuelling do you estimate will take place at the following locations, and why?

The term 'coach' covers many operations, from international European tours to daily school runs.

Short coach journeys provide essential services such as school trips for students. Some school coaches will be dedicated to a single "school run". A more typical mode of operation is to complete the school run, and then complete local day trips (excursions) throughout the day. A second coach and driver will complete the afternoon school return journeys. Local excursions or day trips are seldom more than 120 miles per leg, and the coach will be stationary for several hours at the destination.

Longer journeys cover 200 miles a day or more and can be 600+ miles a day. These are often completed as 'focussed travel' journeys which serve customers who need to get from point A to point B as quickly as possible (for example, major sporting/entertainment venues, scheduled coach travel, rail network relief, or dedicated airport services). Scheduled network journeys will transfer drivers between routes to keep passengers (and coaches) moving day and night. European tours (completed by 10% of the membership of the UK Coach Operators' Association) complete long milage journeys on the first and last day of travel (with drivers resting on a ferry), and then spend a week visiting destinations abroad (four days of travel is typical for this type of holiday). It is important to note that (especially for small coach operating companies) the same coach completing a short journey school runs Monday through Friday may be required to achieve much longer journeys at weekends and outside of term times.

Destination-based hydrogen facilities may be feasible for some significant venues. However, coaches do not currently refuel at these sites, and significant infrastructure, operational, and planning changes would be needed to deliver this service. Most destinations are smaller and may only have a handful of coach arrivals per day (national trust stately homes and parks, for example). Smaller venues are unlikely to sustain dedicated HYDROGEN refuelling facilities.

Depot-based hydrogen refuelling will only be feasible for the largest fleets. Work carried out by Cenex for Midlands Connect indicates that at present cost levels 50 or more buses at a depot are required to justify dedicated hydrogen refuelling infrastructure. Organisations such as National Express operate a network that coordinates driver duty times, vehicle availability, and passenger demand. They may need to adopt significant hydrogen refuelling to continue working this way. With most of their vehicles passing through Greater London each day[5], one or more hydrogen refuelling stations for National Express coaches will likely be required in and around London.

We have indicated that 60% of hydrogen fuelling for coaches is likely to be public locations. We assume this will be public stations in urban areas after dropping off passengers (urban fuelling after dropping off passengers (45%), motorway fuelling during passenger comfort breaks (15%)). In addition to greater London, major nodes in the travel network (for example, Newcastle, Leeds, Manchester & Liverpool, Leicester & Derby, Birmingham, and Bristol) will likely require hydrogen refuelling facilities for coaches. Local (regional) knowledge is needed to identify critical coach refuelling and recharging nodes below the national travel infrastructure scale.

Our best estimate is that direct electrification (battery power) of coaches could power 70% of all journeys. However, the need to include long-range flexibility indicates that more than 30% of coaches will most likely use hydrogen in the long run. Adding the likely constraints for depot-based charging at many small depots (difficulties around cost-effective provision ultra-fast charging at public stations) is part of the justification for the Climate Change Committee's 'balanced scenario'[6], which predicts a 50:50 split between hydrogen and battery electric vehicle (BEV) new bus sales and from 2035 onwards.

It is important to note that providing education and increased mobility for travellers who have become less confident travelling alone is important for our residents. This is likely to grow as a modal shift away from passenger car transport in support of net zero targets will necessitate an increase in the provision of coach services. Support for more and longer coach journeys will be a cornerstone of the UK's success in delivering NetZero by 2050.

a. En-route: 90% total

1). destinations (for example, stadiums, tourist attractions, national parks): 10%

2). public locations (for example, motorway service areas): 60% (predominantly urban (45%) some motorway (15%))

3). transport hubs (for example, ports, airports, coach stations, rail terminals): 20%

4). other locations (please specify):

b. Depots: 10%

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5 https://committees.parliament.uk/writtenevidence/43022/pdf/#:~:text=Infrastructure%20%2D%20We%20work%20with%2030,to%20refuel%20there%20is%20key.

6 https://www.theccc.org.uk/publication/sixth-carbon-budget/

31. Based on your knowledge of current operations, what proportion of zero emission coach recharging do you estimate will take place at the following locations, and why (add detail, where available, on the expected power requirement for charge points at each location)?

Our response to Question 29 above identified the range of activity types that coaches cover, and then focused on longer range journeys which would be more likely to require hydrogen fuel cell vehicles. As noted, many coaches also have duty cycles with much lower daily mileage. A dedicated 'school bus' coach may only travel 20 miles Monday to Friday. A more typical operation is for a coach to complete the morning school run, and then complete an excursion (day trip), with the return school trip at the end of the day being completed by a different vehicle and driver.

In the case of HGVs, our forecast is that most operators of electric trucks will seek to charge in depot, due to the lower cost of electricity and the ability to charge overnight. In the case of small coach operators carrying out local work (e.g. school bus contracts) while they may prefer depot charging, this may be more difficult to achieve.

It is unclear how many smaller coach companies own their depots outright, and this will significantly complicate the adoption of depot-based charging facilities. Independent coach operators will need significant guidance and support to specify, and then negotiate approvals, for the installation of depot-based charging equipment.

Destination charging will also have a critical role for the 'daytrip' section of the coach market. Typical one day excursions will seldom travel more than two hours per leg of the journey. This gives an effective range of approximately 120 miles. If charging facilities are available at or near the destination the use of BEV coaches is entirely feasible for this sector of the market. However, the provision of adequate charging facilities at or near destinations will be crucial to this type of operation.

Where day trip destinations are cities, one possibility is for coaches to share the charging facilities at bus depots. This is already being explored by the industry – at one south London bus depot for example, most of the bus fleet is already switching to electric and they have multiple chargers that are mainly used at night to charge the buses. They are actively exploring the possibility of coaches bringing day-trippers to London using the chargers after they drop their passengers off and charging until they have to return home.

Where day trip destinations are outside urban areas – stately homes or beauty spots for example – many coaches will need to drop their passengers and then go to find charging at sites on the strategic road network, shared with HGVs. Charging at ferry ports may also be helpful, although this will require further investigation into the charging windows that may be available.

For day trip and holiday travellers, the coach journey itself is considered part of the trip. If ultra-rapid charging facilities are built that provided adequate facilities and entertainment for passengers, holiday and excursions customer are more likely than other users (for example 'focussed travellers') to tolerate frequent stops for top up charging if required (excluding airport traffic, which more closely resembles the focused traveller group).

There has been a steady decline in UK bus and coach services[7, 8] for many decades which must be reversed. The need to reduce passenger car transport, and shift towards other modes requires an increase in zero emission bus and coach provision, a coordinating assessment of training, vehicle, and energy needs is required in each region to ensure planed growth in bus provision is fit for purpose.

a. En-route: 40% total (opportunity charging for the most profitable routes)

1). destinations (for example, stadiums, tourist attractions, national parks): 15%

2). public locations (for example, motorway service areas): 15%

3). transport hubs (for example, ports, airports, coach stations, rail terminals): 10%

4). other locations (please specify)

b. Depots: 60% (will require support for smaller operators)

32. What do you consider the barriers are to installing and accessing hydrogen refuelling infrastructure for zero emission coaches at the following locations (be clear if you are referring specifically to barriers in rural or urban locations)?

a. Depots:

Cost - Medium and smaller depots are unlikely to be able to justify the costs of dedicated hydrogen refuelling infrastructure. Work recently undertaken by Cenex with Midland Connect has indicated that (duty cycle dependant) dedicated hydrogen refuelling infrastructure requires 50 to 60 buses refuelling at single location to be cost effective.

Regulatory changes - changes to hydrogen zoning legislation may be required, including the maximum safe production and storage limits for hydrogen

Training - hydrogen has different risk factors compared to traditional fossil fuels, and these need to be understood and acted on by those using the technology. This requires basic hydrogen safety training courses for all those undertaking fuelling and maintenance on hydrogen vehicles.

b. Destinations (for example, stadiums, tourist attractions, national parks):

Cost – only major destinations (such as the top three football league stadia, and major venues such as the NEC) are likely to see sufficient demand to justify the cost of a hydrogen station.

Regulatory changes – these destinations do not currently supply fuel, and it unlikely that refuelling is permitted on their sites. Significant planning and operational change would be required.

Fuel supply business acumen – the supply of fuel to the public is a challenging business environment to operate in, and it is unlikely that stadia and event-based businesses will have the technical

[7] https://friendsoftheearth.uk/sustainable-living/bus-services-outside-london-plummet-new-research#:~:text=On%20average%2C%20across%20England%20and,buses%20by%2052%25%20since%202008.&text=Some%20regions%20have%20fared%20worse,52%25%20in%20the%20North%20East.

[8] https://www.theguardian.com/uk-news/2023/nov/28/bus-services-cut-by-more-than-80-perent-in-parts-of-england-and-wales-since-2008-finds-study

knowledge to deliver a successful fuel provision service. Subcontracting of such services out on their sites may be feasible, but once again requires significant changes to existing regulations and company operating procedures.

c. Public locations (for example, motorway service areas):

Power supply and hydrogen distribution – the creation of hydrogen is extremely power intensive. If major motorway services are to electrolyse hydrogen on site, this will require significant power generation. If motorway services receive trailered deliveries of hydrogen, this is likely to require multiple deliveries per day. If the UK national gas grid converts to hydrogen, this may mitigate a portion of the costs for some sites.

d. Transport hubs (for example, ports, airports, coach stations, rail terminals);

This will vary on a case-by-case basis, and all of the above barriers could potentially apply, depending on circumstances. As noted in the response to a previous question, some ports are looking at hydrogen and may be well situated from a supply point of view. However, this may not apply to ferry ports seeing coach traffic. In general, the interchanges for passenger transport vehicles like coaches are likely to be thronged with people and space constrained, making it difficult to find room for refuelling infrastructure and to keep the public at a safe distance.

e. Other locations (please specify) – none that are not already covered above.

33. What do you consider the barriers are to installing and accessing recharging infrastructure for zero emission coaches at the following locations (be clear if you are referring specifically to barriers in rural or urban locations)?

a. Depots:

Cost – 100m of cable for a single 50 kW charger costs in the order of £15,000, with an additional £30,000 in estimated charger unit and installation costs. This is a significant barrier for independent operators to overcome. In urban areas land agreements may become the dominant issue. In rural areas, proximity to suitable grid infrastructure may become the dominant issue.

Land ownership and leasing agreements – it is not clear how many coach operators own the land on which their depots are situated. In addition, for sites where the grid connection is not adjacent to the depot, additional access negotiations will be required for all properties between the depot and closest major grid connection.

b. Destinations (for example, stadiums, tourist attractions, national parks)**:**

Cost – as noted above, and this is an even greater barrier for a destination to overcome as they will not be able to guarantee how many coaches visiting the site will pay to charge.

Operational changes – these destinations do not currently supply electricity, and it is likely that some operational changes will be required to facilitate charging.

Energy supply business acumen – the supply of electricity to the public is a specialised commercial field for good reason. It is a challenging business environment to operate in, and it is unlikely that stadia and event-based businesses will have the technical knowledge to deliver a successful energy provision service. Subcontracting of such services out on their sites may be feasible.

c. Public locations (for example, motorway service areas):

Power supply. As gross simplification, a typical UK industrial site or fuelling station may have an existing 1 MW production to power all buildings and services (and this will typically have some spare capacity). The provision of multiple 300 kW (or higher) ultra chargers at these sites will be extremely challenging. Even if the grid is reinforced to deliver the amount of power required, substation investment in dispatchable power for peak recharging times may be required.

Other points listed above may also apply.

d. Transport hubs (for example, ports, airports, coach stations, rail terminals);

As for the other location types noted above. Also, as noted in the previous question, passenger transport interchanges are mostly going to be very space constrained, and this is an even bigger problem for charging than for hydrogen refuelling, as the longer dwell time means more space required for a given throughput of vehicles.

e. Other locations (please specify) – none not covered above

34. What specific infrastructure considerations are there for zero emission coaches travelling across international borders?

It will be advantageous if the geographical distribution of infrastructure (i.e. distance between stations) is similar in the UK to the continent.

35. Do you think that members of the coach sector could benefit from working together to support their transition to zero emission, particularly in terms of infrastructure?

Yes, as noted above the bus and coach sector may have a greater prospect for co-working than seen in HGV sector. Bus depots in cities that are day-tripper destinations may be able to allow coaches to charge during the middle of the day when the buses are out working.

36. How do you think that members of the coach sector could benefit from working together to support their transition to zero emission, particularly in terms of infrastructure?

See our responses to Question 35 above.

HGVs and coaches

37. Do you think that zero emission HGVs and zero emission coaches will have similar infrastructure requirements?

Yes, broadly. It is likely that the technical requirements for recharging and refuelling coaches will be similar to those for HGVs. There will, however, be passenger needs and safety considerations for coaches that do not apply to HGVs.

38. How do you think that zero emission HGV and zero emission coach infrastructure requirements will be similar?

Please see the answer to main questions addressed above.

39. Do you think that members of the HGV and coach sectors could benefit from working with each other to support their transition to zero emission, particularly in terms of infrastructure?

While there may be benefits to these sectors sharing infrastructure, in our opinion this is not likely to happen in very many cases. Both coach and HGV operators will wish to use their own charging infrastructure overnight and are unlikely to welcome each other's vehicles on their sites. The sectors will share public infrastructure, such as motorway services, but this will be provided by a third party, mostly private operators, rather than through inter-industry collaboration. The most likely opportunity may be where day-trip coaches need to recharge while their passengers are at their destination, and a commercial HGV depot may be the nearest location, but there will be significant barriers in terms of site access, health and safety, payment systems etc. More likely it will be bus depots sharing with coaches, as in some cases the operators may be part of the same company, and even if not they are likely to have more understanding of each other's operations.

40. How do you think that members of the HGV and coach sectors could benefit from working with each other to support their transition to zero emission, particularly in terms of infrastructure?

Please refer to our response to Question 39 above.

Final comments

41. Any other comments?

Based our combined understanding of both the HGV and coach sectors, this is a summary of our key points:

- The private sector is best placed to invest in, build and operate electric recharging and hydrogen refuelling infrastructure. However, it is important that government at all levels supports them and the HGV and coach operators by providing more national guidance and strategic planning for these sites to ensure there is comprehensive coverage.
- It would be more beneficial to have a comprehensive network of sites, each with a few chargers, adding more as demand grows.
- In the medium to long term, fewer hydrogen refuelling sites will be needed compared to recharging sites, and hydrogen stations should be co-located with charging sites.
- Hydrogen refuelling locations should be identified early, and space set aside for them to make them 'hydrogen-ready', facilitating hydrogen refuelling rollout as and when the necessary level of demand develops.
- While it is likely that the majority of charging for HGVs will take place at depots, the provision of a comprehensive high power public charging network, strategically located along major corridors

and near major urban centres or key destinations such as ports and distribution centres, is essential.

- There is also a significant need for an expansion of quality and reasonably priced lorry parking and driver facilities, and so the opportunity should be taken to plan for both to be provided together.
- Hydrogen refuelling infrastructure is too expensive for most HGV and coach fleets to install on their own, so most hydrogen refuelling will take place at public facilities. It may be necessary to provide some level of subsidy or other assistance to support the rollout of this infrastructure, as its shared nature will make it a more difficult investment proposition when compared electric recharging.
- A large part of the coach industry operates shorted distance services that could be run using electric coaches, but small operators may find it especially hard to install their own charging at depots. Further work to assess this problem is recommended, and this may be another area where national government assistance is required.
- Most refuelling and/or recharging for longer distance coaches will take place in or near urban areas, as compared to HGVs which are more likely to use facilities along the strategic road network and at their key destinations. This is because coaches generally refuel without passengers on board.
- Therefore recharging and hydrogen refuelling facilities for coaches will be required in or around major urban centres as well as along the strategic road network.

EEH, TE and TfSE welcomes the recent Government announcement on 19th October 2023 to invest £200 million increase the numbers of zero emission HGVs deliver approximately 57 refuelling and electric charging sites. This is aimed at:

- Rolling out up to 370 zero emission trucks across the country:
- Creating new jobs and grow the economy while also avoiding food price hikes caused by fluctuating petrol costs; and
- Making £2 million available in demonstrator grants for small and medium-sized businesses in a separate competition to boost innovation and green technology in freight.

However, to address some of the key issues raised above, we would like to see the national government particularly providing more guidance, and possibly some funding to support both local and regional government and the private sector to deliver more charging and refuelling facilities that can accommodate both HGVs and coaches.

The recently updated National Planning Policy Framework (NPPF) published on 5th September 2023 provides only very limited guidance on freight and logistics. The NPPF strengthens the requirement for local planning authorities to take into account the national and regional transport strategies and local transport plans in relation to freight and other transport matters. However, it should also encourage the consideration more recharging and refuelling sites particularly where shared facilities could be provided at existing potential lorry parking and/or distribution sites, or potential new sites using land previously used by local authorities or national transport delivery bodies for works compounds to support the increase in the numbers of recharging and/or refuelling sites.

Similarly, The Local Transport Plan (LTP) guidance, which is under development, could also support the development of local plans to ensure that they support better HGV and coach recharging and refuelling facilities in their areas. This could include recommendations to provide appropriate access

to private lorry parking or charging/refuelling sites, again to accommodate new or more recharging/refuelling facilities.

While we recognise that there is limited national government funding available with which to support the development of more recharging and refuelling infrastructure, it might be worth engaging with the private sector to establish if there are opportunities to use match funding or similar schemes to fund a more rapid expansion of recharging and refuelling infrastructure for both HGVs and coaches.