The Chartered Institute of Logistics and Transport

ROUTES TO NET ZERO 2050

UN CLIMATE CHANGE CONFERENCE UK 2021
IN PARTNERSHIP WITH ITALY

DECARBONISING LOGISTICS AND TRANSPORT

Routes to Net Zero – COP26 Discussion Papers

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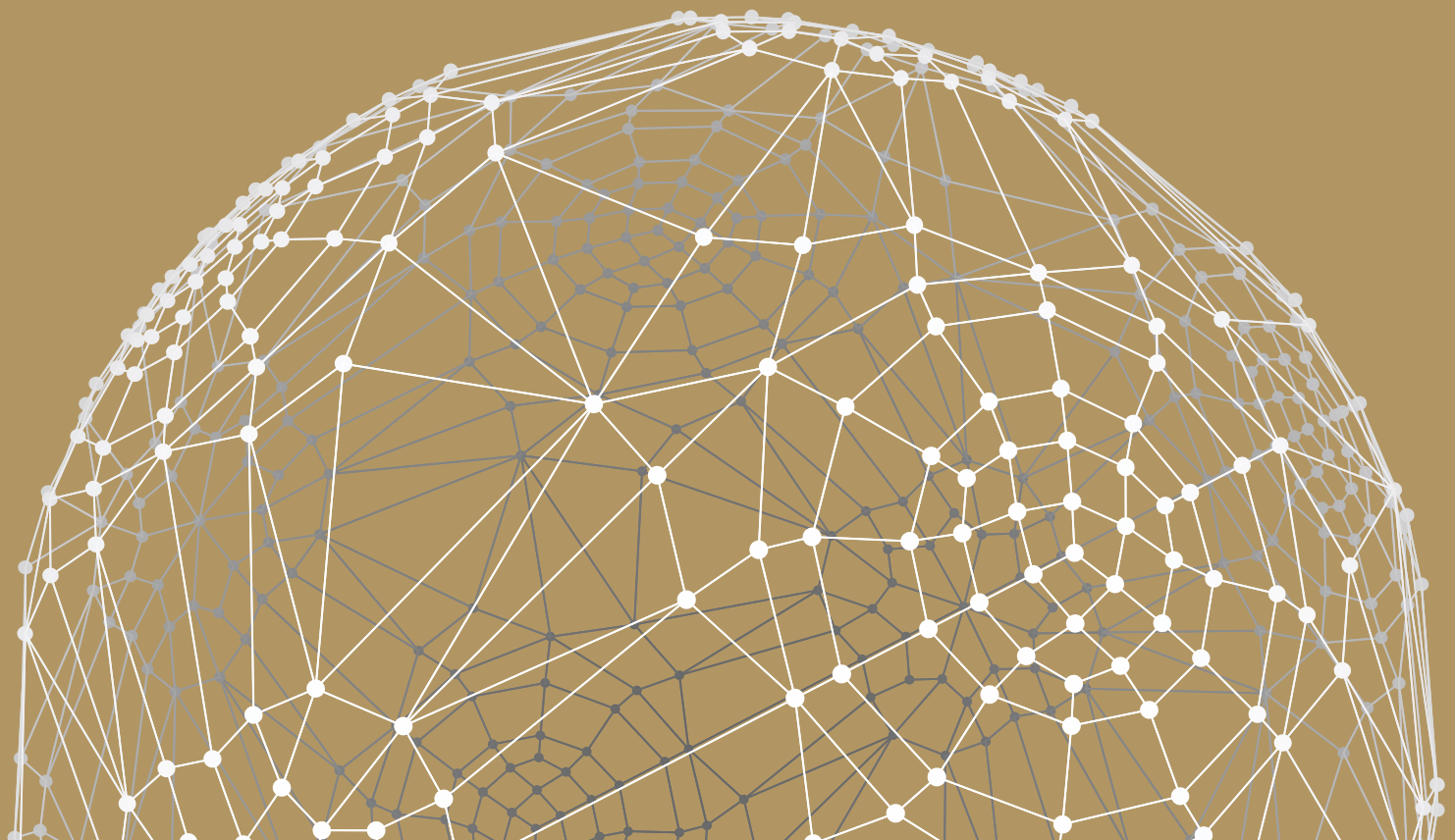

Moving towards a net-zero carbon-based economy

Ahead of the UN Climate Change Conference (COP26) in Glasgow, the Chartered Institute of Logistics & Transport in the UK has produced a series of policy papers covering the challenge of decarbonisation across current and future transport operations and practice.

Developed as part of CILT(UK)'s larger policy campaign Routes to Net-Zero 2050, the seven individual papers cover both passenger and freight transport and seek to set out the problems and issues the logistics and transport sector will face in combating carbon emissions.

Produced by senior industry experts and representatives from the Institute's Public Policies Committee across rail freight, roads and traffic, aviation, bus and coach, accessibility, passenger rail, accessibility and inclusion and road freight sectors, the papers set out to inform and guide the industry through the challenge of reducing emissions.

While each of the reports gives in-depth analysis of sector specific issues, CILT has identified 18 actions and measures that need to be delivered in the route to net-zero.

The recommended 18 actions and measures are:

1. The role of the transport sector

It is recognised that the transport sector is a major contributor to the level of current emissions, and it is incumbent upon the sector to play a full, consistent and sustainable part in reducing emissions, particularly in the short to medium term. The reduction in emissions needs to be a major factor in appraising future transport projects.

2. The importance of this decade

If net zero is to be realised by 2050, many measures will have to be in place during the 2020s.

3. Increased focus

The UK's Transport Decarbonisation Plan is welcomed as a first step in initiating change. But it needs to be more focussed and targeted in what and how change is to be achieved.

4. Land use activities

The interface between land use activities and planning for them and the accompanying transport facilities and services needs to be understood and strengthened.

5. Consideration of changing consumer habits

It is accepted that climate change and the pandemic has brought a major change in travel awareness and behaviour that has led to changing patterns of travel and consumer habits. These are likely to continue and possibly accelerate. The public are now generally more alert to the issues relating to climate change and health. They are adapting their habits where they can sense they will gain benefits. Transport provision will have to follow accordingly.

6. Public and private sector interface

The public/private sector interface is a vital component of how change is to be delivered. The majority of transport services are provided by the private sector, which needs certainty over the direction and scale of change so government must make that clear in guidance and funding. It will need to intervene if it wants decarbonisation to succeed.

7. Local Authorities

Local Authorities (LAs) have an important role to play, particularly on the local interface between land uses and transport. LAs need clear guidance from Central Government on what is expected but it must be sufficiently flexible so it can be adapted to local circumstances.

8. Rural and urban distinction

It is critical to distinguish between the needs of rural and urban communities. There cannot be an 'one size fits all' approach.

9. Quick win opportunities

'Quick wins' are required to promote the importance of change. For example, a group of infill rail electrification schemes, particularly for freight; investment in battery or hydrogen buses; guidance to LAs for Local Transport Plans (LTPs) to prepare detailed plans for decarbonised travel; for active travel (i.e. cycling and walking); a closer interface between land use and transport provision; an acceleration in purchasing electric vehicles and the removal of 'old' fossil-fuelled vehicles; and the introduction of more Clean Air Zones.

10. EVs

Electric Vehicles need encouragement if their take-up is to be accelerated. Electric vehicles do impose costs on highways and these need to be covered through duties or maintenance charges. Electric Vehicle designs must be compatible with the needs of the disabled and charging points must be accessible for ALL. Charging should also be set at reasonable levels but be applied uniformly across the UK.

11. Fuel duty

Fuel Duty revenues are falling so alternative revenues are likely to be needed. Road charging should be considered.

12. Motoring costs and fares

There is an inconsistency between current motoring costs and bus/rail fares, fuel duty has not risen for many years, but fares have. If modal change is to be encouraged, then there should be a more consistent application between what motorists pay and what public transport users pay.

13. Public perception

Public acceptability of change will be vital. Decarbonisation inevitably imposes costs so these need to be fully explained and understood. An advertising campaign should be launched.

14. Pilot schemes

Pilot schemes should be promoted. More funds are required for research into developing new and innovative forms of sustainable travel.

15. Last mile deliveries

Supply chain practices are changing and will continue to do so in response to new global and environmental conditions. Consumer habits will also change accordingly. There is a need to distinguish between trunk haul and local or 'last mile' deliveries. Trunk haul by road will be difficult to change in the short to medium term to alternative fuel arrangements. Many of these journeys are capable of changing to rail haulage, particularly if undertaken as electrified rail freight (and thus with much lower emissions) and should be encouraged by additional route capacity and appropriately located distribution centres.

16. Local delivery EV targets

For local deliveries targets should be set for deliveries to be transferred to electric vehicles by a stated date, but certainly within 10 years.

17. Short-haul and long-haul distinction

A distinction should be made between short haul air flights and long- distance ones. It is conceivable that more modern aircraft (i.e. more fuel efficient) could become available for short haul flights within the next decade. This should be expedited. Alternative means of travel should also be explored and encouraged. It is unlikely that for long haul flights more modern long-range aircraft will be available in the short to medium term.

18. Skills shortages solutions

Skill and driver shortages remain a concern. A re-assessment of needs is required and appropriate training and apprenticeships introduced.

FREIGHT AND LOGISTICS

Countering climate change and improving sustainability

Routes to Net Zero – COP26

FREIGHT AND LOGISTICS – A KEY SERVICE

1. Wherever we live, humans need freight: transportation of life's essentials, from bread, beer and blood, through to cement for building, the new outfit for the night out, and domestic and business waste collection and recycling.

2. The heritage of freight from the last 40 years has been one of enabling and delivering economic growth through the mega trends of centralisation, vehicle and warehouse handling technology, and international trade. Estimates are available that point to the end-to-end logistics costs in the economy have reduced from 10% of revenues to 5 % over the last 40 years.

3. Freight and logistics are a hidden engine of the economy with 2.7 million people employed, turning over £924 billion from 195,000 enterprises and generating £124 billion of GVA or about 10% of the countries non-financial GVA[1].

4. Freight and Logistics moved Centre-Stage as an essential service during the Covid-19 pandemic. Drivers of trucks and trains were being applauded as key workers for food and health supplies; the courier market has also kept some of the economy open. Airfreight of medical supplies were being given priority with pilots and ground handling teams in high demand.

5. It is generally a low margin industry with heavy competition for volume that has kept prices low; however, it is important to recognise that freight is 'derived demand' based on consumer and industrial needs as well as sourcing and supply strategies. Freight can enable economic growth – but does not drive it directly.

6. In the UK the sector moves around 1.6 billion tonnes of freight over 147 billion tonne-kilometres. Imports and exports through our ports are around 400m tonnes with 99% entering or leaving by sea. Rail moves around 70 million tonnes a year, increasingly in consumer goods supply chains as well as with bulk commodities such as aggregates.

7. Contrary to some recent commentary from Government, the sector has a good track record on productivity. Based on the DfT's Transport Statistics Great Britain (table RFS0101), between 2012 and 2019 total freight moved by HGVs rose 8% (from 142.6 to 153.8 billion tonne kms) while HGVs kms rose by only 3% (from 18.60 to 19.13 billion vehicle kms), so that mean load per vehicle actually rose by 5% over 7 years from 7.67 to 8.04 tonnes. Vehicle utilisation is high at over 70%, given that around half of all goods moved are bulk goods (petroleum, aggregates, chemicals etc.) where a backload is more or less impossible. The rail sector lifted some 70m tonnes in 2019, equivalent to 17 billion tonne kms. Growth is strongest in the intermodal and aggregates sectors.

8. The sector is almost totally carbon intensive. Freight and logistics is an important contributor to emissions with HGVs and LGVs contributing 31% of carbon and 30% of NOX from just 21% of vehicle mileage. This is approximately 9% of UK national emissions.

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1. FTA, 2019, The Logistics Report accessed on-line at https://www.santandercb.co.uk/factsheet/fta-logistics-report-2019.pdf

9. The CILT recognises that Freight and Logistics has a key role in 'greening' the economy. We have worked intensively on the policy issues and this short note provides a high-level view of our conclusions on the issues, opportunities and solutions.

MEGATRENDS FOR THE COMING DECADES

10. The mega trends of the last 40 years of centralisation of logistics networks and the use of global sourcing (almost entirely low-cost and carbon intensive) have played out, reaching saturation in most sectors. Accessing sourcing specialisation, low-cost labour and economies of scale have been the foundation of western prosperity.

11. Now, alongside the imperative to decarbonise, we see other structural changes to which the sector must pivot towards and design new solutions.

- A rapid structural decline in physical retailing, which may be mirrored in other sectors to a lesser extent (e.g. chain restaurants) with a corresponding surge in on-line transactions.
- Re-shoring and near shoring of supply chains responding to re-balanced costs and the need for improved resilience.
- Evolving regulations and incentives relating to travel and road access designed to address congestion and manage capacity.
- These new megatrends are influenced by and draw on emerging technologies: battery power, automation, robotics, additive manufacturing, digital integration, inter alia.
- In line with all transport, other perhaps than rail, freight and logistics has not been paying the true cost of its environmental footprint: health, emissions and climate change especially. This historical situation must be expected to change with government (national and local) becoming much more engaged in driving societal outcomes.

14. In this context, the coming decades for freight and logistics will be about:

- Fulfilling the basics: maximising customer service while minimising costs.
- Decarbonising freight and logistics through the introduction of zero emissions technologies for motive power.
- Adapting supply chain and logistics networks and operating models to accommodate the characteristics of the new technologies.
- Adapting supply chain and logistics networks and operating models to new patterns of customer demand.
- Adapting supply chains and logistics networks and operating models to respond to new sources of supply and manufacturing capabilities.
- Adapting supply chain and logistics networks to respond to societal measures relating to congestion, air quality, city streets, declines in physical retail, road use and access.

15. In the UK, supply chain and logistics resources are 100% privately invested: ports, warehouses, rolling stock, vehicles. Only the roads and rail tracks are in public control. That means that much of the response to these new trends will need to be funded by the private sector and to accommodate the adaptations noted, there will need to be public-private alignment on new models in a way not previously achieved. Investment will only gather pace when operators have a clear view of the policy landscape including how they will be paying for the true environmental and access costs.

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Government needs to understand and promote a new approach to operating models, making best use of already available techniques. such as modal switch, alongside exploration of new technologies, which may or may not make the transition to practical operation.

16. So, the freight and logistics industry faces significant investment uncertainty both on the trajectory and availability of technology, the nature and consistency of regulation and the available capacity. The emergence of 'disruptors' that currently have investment backing and are exploiting weak or non-existent legislation cannot and should not be relied on to solve current problems.

17. While the sector has a great track record of responding to new demand, the risk is the 'net national impact' may be both late and negative while it waits for sufficient certainty. The scale, time pressure and complexity of change required is considerably greater than has occurred to date and is likely to be of a more revolutionary nature than the essentially evolutionary change of the past.

THE UK GOVERNMENT WHITE PAPER: DECARBONISING TRANSPORT – A BETTER GREENER FUTURE

18. The CILT recognises the key contribution that the sector must make to the decarbonization of transport and welcomes the White Paper outlining measures to decarbonise transport of all modes, many of which we recognise from our own policy work and submissions.

19. With respect to Freight and Logistics we particularly support:

- Deadlines for stopping sale of carbon powered vans and trucks.
- Measures to decarbonise, support, protect and promote rail freight including modal shift.
- The development of a Local Authority Toolkit to support the delivery of more sustainable transport measures; we would welcome being involved in its development.
- Measures to improve data sharing and integration in the supply chain as well as to support better planning and design.
- An emphasis on transforming the last mile – although the approach outlined lacks many essential elements including land use planning.
- An acknowledgement of the issues in rural areas which will require special innovation and particular policy focus.
- A recognition that the embedded carbon in changes in infrastructure to support future de-carbonisation must be factored into planning (albeit that the embedded carbon in the goods and services customers are consuming is missing).

20. There is much detail to resolve to go alongside the concrete proposals for the phasing out of carbon fueled internal combustion engines including the provision of adequate electrical charging infrastructure.

21. There is an expectation, we would say over-reliance, that technological development will fill the gaps. There are also some areas of the policy that are simply aspirational rather than concrete.

22. Government needs to understand and promote a new approach to operating models, making best use of already available techniques. such as modal switch, alongside exploration of new technologies, which may or may not make the transition to practical operation. The urgency of carbon reduction requires a parallel development approach as was deployed in the covid vaccine development.

Achieving decarbonised freight and logistics must address the following issues:

23. Freight and logistics are not homogeneous. It is a common misconception that it is just about huge articulated and drawbar trucks and internet parcel couriers; we estimate that these are less than 30% of HGVs and 10% of LGVs respectively. Commodities engage separate supply chains and specific assets, many of which will have different implementation issues in their de-carbonisation implementation.

The apparent underlying assumption that all last mile deliveries are parcels must also be challenged.

24. This will need to be recognised in any regulation or guidance to LAs and means that expectations of the opportunities to reduce freight movements in cities will likely be over-optimistic.

25. It also means that the potential for Compulsory Consolidation mentioned in recent government publications will be an economic penalty for many operators. For example, the operator of a full truck of food going to 2 or 3 convenience stores with an EV will simply incur extra costs if consolidation is mandatory for no added value; it is unlikely that the store customers would be willing to pay more. The apparent underlying assumption that all last mile deliveries are parcels must also be challenged. Furthermore, the implication that powerful companies like DPD, DHL, UPS and amazon will cooperate and pay each other to deliver (or that LA's become service providers) is a huge commercial and organisational stretch, if that is indeed the goal?

26. Compulsory consolidation for those channels where it is economic requires a positive policy link to land use planning. The National Infrastructure Commission identified land use as a key component of decarbonizing freight. This is essential to provide investment certainty. There will be a requirement for a range of freight related facilities in a zero-carbon world – from edge of city staging or modal exchange of swap bodies to vehicle charging, full scale consolidation, and inner-city micro-hubs. LAs need clear guidance on the conditions for this and proactively put that capacity into their planning systems.

27. The introduction of Clean Air Zones to different standards implemented at different times means vehicles are already being 'shuffled' around the country and operators are mitigating cost increases by 'gaming' the system. There needs to be clear guidelines and timescales for introduction of such zones to increase certainty.

28. The need to resolve conflict between freight and passenger movements in the de-carbonisation process is critical to moving forward. In urban situations passengers have choices which are not available to freight.

29. The CILT argues that expectations that freight can be reduced in cities are over-optimistic and planning for freight alongside walking and cycling should be a priority. While the government has argued that it wants to avoid a car led recovery, the emphasis has been on behavioural change to encourage alternative travel modes and at the same time there is a stress on the low cost of electric car ownership. Such signals are clearly conflicting, and risk increased congestion. Cars are 75% of the problem and have to pay their fair cost for accessing public facilities.

Some signposts for specific measures in support of decarbonising freight:

30. The following bullets provide some signposts on CILT thinking described across three areas.

- Urban and suburban – Minimising the adverse interactions between freight and passenger movements means moving many freight movements into off peak periods as far as possible, as was achieved during the London Olympic Games. With quiet electric vans and trucks the opportunity to run freight at night and in off peak periods is opened up with reduced impacts on residents. Managing this through edge of town switching, staging and consolidation (where appropriate) as well as the use of inner-city micro-hubs, and providing operators with options, would seem to improve certainty to operators in a way they do not currently have. It also requires the land use planning questions to be addressed and in big conurbations these may require inter LA arrangements, managed at a more regional level. We do not support mandatory blanket consolidation; the planning conditions and regulations should be set to provide incentives to operators to reset their networks.
- Rural – the CILT has recently published a paper on the future of rural logistics which recognised the issue of limited mobility causing deprivation in rural areas, the lack of vehicle charging capacity and the power distribution, the greater distances to be covered and the different industrial landscape. We argued that there is a risk that decarbonization of transport will add to rural deprivation and put the rural economy at a disadvantage. We advocated the introduction of joint passenger – goods licenses and equipment, regional hubs, pioneering Mobility as a Service (MaaS) and joint public/private sector services. In addition, some of the technology identified in the TDP may become more applicable to rural areas; for example, it is becoming clearer that the most likely benefits from delivery drones will be in high value/long distance movements, such as critical medical supplies to remote communities.
- Inter-urban and long-distance movements – the long-distance movement of freight from port or production plant to warehouse, from plant to plant, or warehouse to conurbation is largely by HGV for which the decarbonization pathway is less clear to achieve phase out by 2040. Amid talk of motorway catenary power and hydrogen power, the CILT would stress the opportunity to switch more freight to rail by enabling the development of intermodal terminals to encourage flexible freight use of the rail network, e.g. non-full loads and chilled food. Network Rail's forecasts are for rail freight to double over the next 25 years, for which adequate network capacity will be required This again will require attention to land use planning. This will take the form of major rail-connected warehousing facilities for National Distribution Centres (NDCs) and, especially, Regional Distribution Centre (RDC) clusters, plus simple modal transfer points at major manufacturing sites and in urban areas. The CILT has reservations in relation to the 2035/40 phase out dates in the current consultation.

Amid talk of motorway catenary power and hydrogen power, the CILT would stress the opportunity to switch more freight to rail by enabling the development of intermodal terminals to encourage flexible freight use of the rail network, e.g. non-full loads and chilled food.

31. All of these scenarios require radical changes to traditional operating models and for public policy to align to a clear vision for the future of freight. The current commercial imperatives for the customer, freight operators, and the sellers of the goods and services is a huge barrier to progressing such an agenda. Public resistance to planning applications is also likely to be a major barrier, given that there is strong prejudice against freight operations. The government should devote effort to communicating the benefits alongside mitigating actions that can be taken.

32. Finally, and perhaps most controversially, CILT sees no alternative in the long term to road user charging covering all journeys/roads and working on a time of day and distance basis and replacing current taxation on vehicles. This is not a direct dependency for de-carbonisation but will greatly assist its implementation and fill an impending £35billion government revenue hole.

Public resistance to planning applications is also likely to be a major barrier, given that there is strong prejudice against freight operations. The government should devote effort to communicating the benefits alongside mitigating actions that can be taken.

PASSENGER RAIL

Routes to Net Zero – COP26

This paper gives CILT's view of the prospects for decarbonisation of passenger transport through interventions in rail as part of a series of papers prepared at the time of the COP26 meeting in Glasgow in November 2021.

INTRODUCTION

1. This paper gives CILT's view of the prospects for decarbonisation of passenger transport through interventions in rail as part of a series of papers prepared at the time of the COP26 meeting in Glasgow in November 2021. Rail freight is covered in a separate paper, but many of the measures for freight are similar to those proposed for passenger rail.

CURRENT AND FUTURE EMISSIONS

2. Passenger Rail contributed only 0.5% of domestic GHG emissions in 2019 (about 2.5MtCO_2) (Source: ORR). In the short-term future, demand for passenger rail is difficult to predict and the pattern of demand may be changing. In the longer term, existing commitments will provide capacity for significant growth, with major schemes such as HS2, an Integrated Rail Plan for the Midlands and the North of England, and East-West Rail, as well as smaller schemes such as rail re-openings. However, unless further action is taken, passenger rail emissions would rise with increasing train mileage. The measures outlined below will ensure that emissions can be reduced and eventually eliminated.

3. The 2.5 MtCO_2e emissions from passenger rail can be seen in the context of the Sixth Carbon Budget (CB6) of 965 MtCO_2e, an annual average of 193 MtCO_2e, for the period 2033-37, including emissions from International Aviation and Shipping (IAS). This represents a fall of more than 60% compared to 2018-19.

DECARBONISATION MEASURES

4. There are three approaches to reducing transport emissions through interventions in or affecting the rail sector:

- Avoid or reduce the need for transport, for example by planning developments around rail to minimise transport needs by high emissions modes and reduce carbon emissions;
- Shift traffic to rail from higher emissions modes, such as road and air;
- Improve by reducing carbon emissions from rail for a given amount of traffic.

5. Spatial plans should be based on sustainable travel patterns. For major new communities or employment sites, this means locating them where rail access is possible and designing them around sustainable travel (eg. '15-minute communities'). For the much greater number of existing places, relocation is not always possible, but concentration around rail stations and the avoidance of 'out-of-town' developments or expansions are appropriate. Similar planning policies are noted in the rail freight decarbonisation paper for distribution centres.

Electrification of some currently unelectrified lines is therefore essential to ensure the withdrawal of passenger diesel trains. The main existing examples are the Midland Main Line, Chiltern Line, Trans Pennine, parts of the Cross Country lines, north of Glasgow/Edinburgh and west of Bristol/Newbury.

6. The second approach is to encourage mode shift to rail. To an extent, the carbon benefits of a shift to rail depend on how quickly other modes are able to decarbonise. However, aside from walking and cycling, passenger rail already produces the least emissions and mode shift will therefore be valuable in achieving vital early reductions, as well as in the longer term. Mode shift depends on the availability of services and relative fares/costs, as well as making rail convenient and easy to use by all sections of society, with special consideration being given to accessibility. In the short term, some more rail services can be provided if there is spare capacity and in the medium to longer term, HS2 and other major schemes will provide more capacity. Integration of rail with other modes is also a key element of mode shift.

7. The relative costs of using rail compared with other modes has undoubtedly been a factor in holding back mode shift in the past. Rail fares are perceived as expensive and inflexible (athough perception and reality are often different) compared with the fuel cost of road travel and air fares. Also, the cost of car use has increased less rapidly than that of public transport fares over recent years. Electric car running costs are lower than petrol/diesel, so much will depend on how taxation (or road pricing) is adjusted. Air fares will probably rise with increasing carbon costs. Rail fares are being amended with the plans laid out in the Williams-Shapps plan, but the overall level of fares will depend on political decisions as to how much of the railways is to be funded by the users and how much by the taxpayer.

8. The third approach is then to improve the emissions performance of existing passenger trains and electrification is key to achieving this. Currently, 70% of the passenger rolling stock fleet is electric and 38% of the track is electrified (NR TDNS). Track electrification and the replacement of diesel locomotives will be the primary measure for achieving rail freight decarbonisation, and the same electrified lines can also be used by passenger and freight trains, resulting in benefits being shared between both passenger and freight.

9. Electrification of some currently unelectrified lines is therefore essential to ensure the withdrawal of passenger diesel trains. The main existing examples are the Midland Main Line, Chiltern Line, Trans Pennine, parts of the Cross Country lines, north of Glasgow/Edinburgh and west of Bristol/Newbury. Many of these have key freight flows as well as passenger. For the last two (and several other locations) this has been mitigated by using bi-mode trains with both electric and diesel power but even here the plan is to avoid the use of diesel power in the longer term.

10. While the cost of electrification has been substantial, there are indications that costs are being reduced, particularly where expertise and lower cost solutions can be developed. Nevertheless, electrification is difficult to justify on lightly used lines. One advantage is that rail electrification technology is relatively mature, whereas in other modes it is in its early stages, and this means that some of the earliest decarbonisation gains can be achieved by rail.

A rolling programme of track electrification, replacement of rolling stock and the introduction of complementary power sources (battery or hydrogen) for both passenger and freight rail infrastructure and operations can achieve further reductions to zero emissions.

11. The remaining diesel passenger rolling stock will need to be replaced as it becomes life expired and where lines are electrified. Modern electric trains are available, are less expensive over their whole life and can be financed by the private sector. The addition of emissions benefits should help to justify the case for acquisition.

12. There remains the need to power trains for lines where electrification cannot be justified. Battery, hydrogen and flywheel trains have been tested and all seem to work in particular locations. At this stage it is probably not necessary to decide which of these to concentrate on and, indeed there may be opportunities for all of them in particular locations. Again, the parallel development of freight locomotives with these power sources will help to spread the development costs. Also, hybrid schemes should be considered where otherwise full electrification schemes would be discounted due to affordability.

13. In making the case for electrification, new or re-engined rolling stock and any associated developments, the benefits should include the alignment with the carbon reduction strategy. Network Rail's recent publication, 'Our ambition for a low emission railway' highlights the significance of emissions from construction work. We suggest that, in examining all transport schemes, the carbon impact over time be presented to decision makers including, where appropriate, the carbon payback period (the period in which operating savings offset the embedded carbon from construction).

14. To achieve the full potential carbon reduction from electrification, an adequate and reliable supply of renewable energy is required. Priority should be given to developing renewable sources of energy for rail use. Network Rail is already doing this for non-traction and is investigating it for traction.

CONCLUSION

15. Rail transport is already the least carbon intensive powered form of transport in most markets (apart from shipping) with emissions typically 20-25% of those for other modes. Reductions in carbon emissions in the short term, so vital to following the route to net zero 2050, can therefore be achieved by the greater use of the existing rail network. A rolling programme of track electrification, replacement of rolling stock and the introduction of complementary power sources (battery or hydrogen) for both passenger and freight rail infrastructure and operations can achieve further reductions to zero emissions.

RAIL FREIGHT

Routes to Net Zero – COP26

1. INTRODUCTION

1.1. The much lower rolling resistance of steel wheel on steel rail, compared with a rubber tyre on asphalt or concrete roads, means that rail has an inherent advantage in terms of energy required and emissions produced by the movement of freight, irrespective of the fuel used for traction.

1.2. In addition, rail already has fully mature systems for zero carbon traction. Renewable or nuclear electricity fed through overhead wires (or a third rail) reduces carbon and other emissions, such as particulates, close to zero. It follows that, with currently available technology, freight can be moved by rail with substantially lower emissions than road (or air).

2. PRESERVING THE CARBON BUDGET

Renewable or nuclear electricity fed through overhead wires (or a third rail) reduces carbon and other emissions, such as particulates, close to zero.

2.1. The August 2021 IPCC report included a 'Code Red' warning that carbon emissions must be reduced as matter of critical urgency if irreversible climate change is to be avoided. Many of the changes needed in society if this is to be achieved are fundamental and extremely difficult to deliver. In contrast, modal shift of trunk haulage from road to rail – using intermodal equipment that replicates a standard 13.6/15.5m road trailer – is an easy and straightforward change in many supply chains.

2.2. Diesel-hauled rail movement typically involves carbon emissions around 60% lower than the equivalent road move, so substantial – two thirds reductions in the carbon footprint of a supply chain are achievable in a very short timescale. Given that each freight train saves 50-70 HGV drivers, this would also provide a significant contribution to alleviating the acute shortage of HGV drivers which is having a major impact on industrial and retail supply chains

2.3. It follows that Government can achieve multiple policy objectives by incentivising the early and rapid switch of trunk road movements to rail in advance of electrification.

3. ACHIEVING ZERO CARBON – MODAL SHIFT OF TRUNK HAULAGE

3.1. It is widely acknowledged that the difficulty of decarbonising some aspects of the economy, notably agriculture and long-haul aviation, means that most other sectors – including surface transport – will need to achieve true zero carbon emissions. Within the surface transport sector, battery cars and vans are already an everyday sight. Solutions for buses are emerging and, within the next year or so, vehicle manufacturers will be offering medium weight battery trucks (up to 26 tonnes glw) with a range of around 100 miles/200 kms.

Recent analysis of UK road freight statistics suggests that just over half (52%) of all HGV tonne-kilometres (and thus – broadly – carbon) are generated by trips that could potentially be suitable for modal switch to rail.

3.2. This truck capability will probably edge up as battery technology continues to evolve, but a battery 44 tonnes glw long distance HGV – the workhorse of UK and European logistics – is not even in prospect. Hydrogen is seen in some quarters as a possible solution but manufacturing hydrogen (as opposed to that which is available as a by-product) is deeply energy inefficient, consuming three times as much electricity as using the power in its prime form. There are also serious unanswered concerns about the feasibility and safety of hydrogen distribution, fuelling and on-board storage.

3.3. Small-scale German and Swedish trials of motorway electrification (using around 20 trucks and dedicated drivers), with wires strung over the inner lane for use by trucks equipped with pantographs, are taking place. These suggest that the 'e-Highway' system is technically feasible, but there are profound issues about the operational and public safety aspects. Electrified railways are a very largely private system from which the public are excluded (with palisade fencing in certain areas) and running high voltage power cables over a public highway begs serious questions.

3.4. Similarly, whereas a railway is precisely guided system, the e-Highway requires thousands of truck drivers (of somewhat mixed ability) to steer a very precise course for many hours. Even with technical assistance, this is extremely demanding and one error by one driver could bring down the wires across all lanes of the highway, with very serious consequences. De-wirements are not unknown on railway systems and must be regarded as highly probable with free-steer HGVs.

3.5. Unlike Germany and other parts of Europe, where HGV trailers are of a standard 4m height, most UK trailers are 4.2m high and significant numbers of 4.9m double-deck trailers are now in use. These leave insufficient room under bridges for catenary wires to be accommodated and it is hard to see how, even if the e-Highway is judged feasible on the Continent, it is operationally viable in the UK.

3.6. It follows that trunk road haulage is likely to be a very difficult sector to decarbonise. This is where modal switch to rail can play a major part in achieving the Zero Carbon imperative. Recent analysis of UK road freight statistics suggests that just over half (52%) of all HGV tonne-kilometres (and thus – broadly – carbon) are generated by trips that could potentially be suitable for modal switch to rail. This is defined as freight moving over 200km plus bulk commodities in the 100-200km range – the type of trips that occur currently across the UK rail network. The remaining 48% of tonne-kms is generated by shorter distance trips.

3.7. There will be a number of reasons specific to certain supply chains why some journeys of this nature are challenging to switch to rail. Contrary to some suggestions, this has little to do with the nature of the goods moved. Fresh, chilled and frozen food – for example – move by rail on a daily basis in refrigerated swap bodies (similar to shipping containers) between UK distribution centres. Rather, the challenge is likely to be the aggregation of 40-50 HGV loads to provide the frequency of deliveries required by some supply chains, particularly in remote areas.

3.8. Nevertheless, more granular analysis suggests that over a third (38%) of HGV tonne-kms are likely to be well-suited to modal switch. Coupled with the 9-10% of UK surface transport already on rail, it is conceivable that just short of half of all UK tonne-kms could be moved by zero-carbon electric rail traction. The use of electric rail for the trunk haul dovetails well with shorter range battery trucks undertaking local and regional distribution, together providing a fully decarbonised supply chain and offering a New Model of Logistics.

4. MAKING IT HAPPEN

4.1. What needs to be done to realise this opportunity? Electric locomotives have existed for many years and are common place across Europe. The UK diesel freight locomotive fleet will become due for renewal in the 2030s and it is clear that the replacement locos are likely to be powerful electrics (probably of 8/9000 hp) with battery capability for working in terminals and along unelectrified branch lines of 5/10 miles in length. The private sector UK Freight Operating Companies have indicated a willingness to invest in such equipment so long as the network they use is electrified.

The F2MN upgrade – essentially, doubling two relatively short stretches of single track - should be delivered by 2030.

4.2. The core UK freight network, carrying over 90% of all freight, consists of around 2000 route miles. Around two thirds of this mileage is already electrified and wiring a further c.700-800 miles would complete the core network and allow electric locos to be used across the system. This programme of freight electrification should start with the short missing sections of wires that cause trains to be diesel-hauled over hundreds of miles for the want of few miles of wires. It is estimated that 2 million train miles a year could be converted to electric haulage if less than 50 miles were wired. Early implementation of rail freight electrification is a key element of UK decarbonisation and should be an urgent priority for Government infrastructure investment.

4.3. Concern about the ability of the UK rail network to absorb the extra freight trains that would be associated with modal shift is understandable but unfounded. Converting the 38% of HGV tonne-kms identified above to numbers of trains, using current best practice of 50-80 HGVs per train (i.e., not assuming further increase in train size), equates to 1 or 2 extra freight trains an hour in each direction on most main lines: not insignificant, but unlikely to cause major capacity issues.

4.4. Two key arteries – the West Coast Main Line (WCML) and the route from Felixstowe to the Midlands and North (F2MN) – would see an extra 3-4 trains in each direction per hour. HS2 will release substantial capacity on the southern half of the WCML and this should be more than adequate to cater for the additional freight trains required. F2MN and WCML North have long been recognised as needing additional capacity and plans to deliver the necessary enhancements should be accelerated. The F2MN upgrade – essentially, doubling two relatively short stretches of single track – should be delivered by 2030. With a revised timetable to provide optimum capacity utilisation, it is likely that WCML North can be enhanced without major construction activity and should be delivered by the mid-2030s.

Urban logistics can be decarbonised and emissions reduced by using electric rail to the edge of the urban area and battery trucks or vans for final deliveries.

4.5. Finally, an intermodal system using electric rail for the trunk haul and battery trucks for local and regional distribution, requires – by definition – intermodal terminals where modal transfer between road and rail can take place. Land use planning policy should encourage and facilitate such terminals, ensuring that strategic decarbonisation imperatives can be delivered. Three categories of terminals can be identified:

- Major concentrations of warehousing, where on-site rail facilities allow freight to be loaded directly to rail without the need to use public roads, which adds substantial additional cost and makes it harder to switch modes. Such Strategic Rail Freight Interchanges (SRFIs) are being created in the Midlands 'Golden Triangle of Logistics' but more are needed here and in the regional distribution clusters around the UK.
- Major sources of freight should be rail connected wherever possible. Ports connectivity is generally good but there are many major manufacturing plants alongside or close to a railway that could be connected without undue difficulty. The Highland Spring water bottling plant, less than 50 miles from the COP26 venue, is an excellent example of what can and should be done, with Government incentivisation
- Cities and other large urban areas are large consumers of freight, both retail goods and bulk products. Urban logistics can be decarbonised and emissions reduced by using electric rail to the edge of the urban area and battery trucks or vans for final deliveries. Simple modal transfer terminals are needed, where small urban-friendly containers with retail goods or bulk materials can be transferred from train to truck. Identifying and facilitating such terminals is a key planning policy requirement, particularly in the face of competition from other land uses. Most other activities, including housing, can be located at a variety of sites, but modal transfer necessarily has to take place where main rail routes and arterial roads intersect.

5. CONCLUSION

Modal switch of trunk haulage to electric rail can offer a true Net Zero solution for freight and logistics. It requires a number of actions, primarily from Government, but all are low risk extensions of current systems and technologies. The solutions are available but will take time to implement – investment in the necessary infrastructure needs to start now if the UK is to reach Net Zero by 2050.

AVIATION

Routes to Net Zero – COP26

Choice is determined by price, convenience and quality. Shippers also choose air freight on cost and time grounds but, for perishable and time sensitive items over long distances, there may be no alternative.

INTRODUCTION

1. This paper gives CILT's view of the prospects for decarbonisation of aviation as part of a series of papers prepared at the time of the CO26 meeting in Glasgow in November 2021.

CURRENT CO_2 EMISSIONS

2. In 2019, UK aviation was responsible for 38 $MtCO_2e$ of emissions, which is about 1% of domestic emissions and about 7% of UK transport emissions. The amount of emissions has been largely unchanged since 2005, despite a 30% increase in passengers and a 7% increase in cargo, albeit with a 4% decrease in Air Transport Movements (mainly because of an increase in average loads). Covid-19 reduced passenger numbers by around 75% in 2020, but the impact on cargo was less. A return to 2019 levels is forecast for 2023/24.

NON CARBON EMISSIONS

3. CO_2e is an acceptable method of measuring the carbon equivalence in terms of climate change of a range of emissions but current research indicates that the total impact of aviation GHGs is greater than is measured by their CO_2e. Research is ongoing and many measures which lead to a reduction of carbon emissions will also reduce non-CO_2 emissions. Consequently most future scenarios which reduce CO_2 will reduce total aviation climate change impact.

CARBON BUDGETS

4. Following the Committee on Climate Change's advice, the Government has adopted a Sixth Carbon Budget (CB6), including aviation, of 965 $MtCO_2e$, an annual average of 193 $MtCO_2e$, a fall of more than 60% compared to 2018-19. We have previously called for an aviation carbon budget consistent with the total.

PASSENGER AND CARGO DEMAND

5. Passengers choose to fly to go on holiday, to visit friends and relatives, for education, culture and sport and for business. Choice is determined by price, convenience and quality. Shippers also choose air freight on cost and time grounds but, for perishable and time sensitive items over long distances, there may be no alternative. Competition for short haul flights comes from rail and road and from shipping for long distance cargo. UK aviation is largely unsubsidised so, if an airline can provide a profitable service, it will do so. However, the management of demand has been a policy for many years with taxation, environmental restrictions and airport capacity limits being the prime methods of management.

INTERNATIONAL ACTIVITY

6. UK aviation is predominantly an international activity. 86% of UK passengers are on international flights and 96% of emissions are from international flights. Many UK airlines and airports have some international ownership. Most aircraft are constructed by multinational companies or companies with partners in different countries. While the UK has excellent regulation, much safety regulation is done under an international umbrella. Overriding many aviation activities are country-to-country agreements, either bilateral or multilateral, which have their origins in the Chicago Convention of 1944. The International Civil Aviation Organisation (ICAO) is a United Nations agency. International agreement on aviation decarbonisation is therefore vital.

FUEL EFFICIENCY IMPROVEMENTS

7. It is notable that existing programmes are forecast to achieve a reduction of 25% in CO_2e by 2050 compared with a Do Nothing situation and that with high ambition scenarios this increases to 36%. Clearly insufficient by itself, this provides a basis for looking at more radical measures. One of the existing methods of regulation is ICAO aircraft certification standards, which have recently been amended to include aircraft emissions. There is an opportunity for the UK to press for more stringent standards which will result in the removal of older aircraft, as has been the case with aircraft noise standards.

ZERO EMISSION AIRCRAFT

There will also be opportunities for hybrid technologies involving a mix of electric and hydrogen power and, in an interim stage, involving a mix of conventional fuel and electric power (as with hybrid cars).

8. The goal of the airlines is to replicate the present route networks and patterns of operation into the future to meet customer demand but with the most sustainable power or fuel option compatible with power and range. Up to 2050 that means battery or a form of hydrogen power for short haul flights and SAF for long haul. Battery/electric technology is very well understood, but its development for aviation will require significant upgrades to battery technology. An advantage of battery/electric technology may be that the optimal cruise altitude is probably significantly lower than with conventionally-fuelled aircraft (so probably less power will be needed in the take-off cycle and high altitude effects may be less) and the optimal cruise speed is lower (needing less power in cruise). In addition, it may be possible to regenerate power in the descent phase if propellers are used. Hydrogen in a fuel cell might be an answer, but the effects of producing water and NO_x need to be considered. There will also be opportunities for hybrid technologies involving a mix of electric and hydrogen power and, in an interim stage, involving a mix of conventional fuel and electric power (as with hybrid cars).

9. In the short term, small battery/electric aircraft are being developed for short range operations. Some have already been ordered by airlines (eg. United Airlines order for 100 Heart ES-19 aircraft), and several countries are planning trials or operations in the next few years. There are several UK domestic routes which would be ideal for a trial of such aircraft, for example in the Highlands & Islands (where the Scottish Government is already planning a trial) and between Northern Ireland and the British mainland. In the medium term, there are again several projects under development by manufacturers, some in partnership with airlines (eg. Wright Electric and Easyjet). Airbus is developing a range of hydrogen-powered models from a small turboprop with a conventional airframe to a radical blended wing design with turbofan engines.

10. Our view is that battery/electric and/or hydrogen/electric zero emission aircraft can replace most of the current fleet of short haul aircraft by 2050. In the UK context, 71% of passengers in 2019 and 79% of Air Transport Movements were either domestic or EU, which is essentially the short haul sector. This change should provide a substantial amount of the required reduction in emissions by 2050, probably much more than indicated by the scenarios used by the Government to demonstrate pathways to net zero. Other countries with large aviation markets also have very significant short haul sectors, such as the USA, China, India, and indeed most of the rest of Europe, so this market can be the main thrust for zero emission aircraft worldwide.

Offsetting is a matter which relates to many more sectors than just aviation (and will therefore be in much demand), but there is clearly a range of mechanisms ranging from tree planting to the removal and storage of carbon from exhaust gases.

11. Battery/electric and/or hydrogen/electric aircraft may eventually be suitable for long haul flights by large aircraft but, in our view, not by 2050. However, research into more powerful fuel cells could lead to applications for longer haul flight and other transport modes, if co-ordinated government support and funding is provided. It is also possible that long haul travel could be achieved by smaller electric and/or hydrogen aircraft by a series of short 'hops', as used to be the case before jet aircraft became capable of flying non-stop between London and New York and other similar routes. The intermediate stops would probably be technical stops (under second-freedom rights) but the demand for fifth freedom rights (broadly, the right to carry passengers between intermediate stops) would be large and there would be much inter-state negotiation for these. Costs would be inherently high because of the reduced number of passengers per aircraft, crew scheduling, aircraft utilisation and fuelling/battery charging which would result in high fares. These time and price increases will make such travel very unattractive and, indeed, similar to the levels of connectivity before the advent of wide-bodied long range aircraft. Note that this would also apply to the substantial amount of long-haul all-cargo flights by large aircraft.

12. In aggregate the scale of activity required to develop improved battery/electric or hydrogen/electric systems together with airframes optimised for these power sources is very great, and the timescale is short if these aircraft are to form the world's commercial fleet by 2050 perhaps the task is comparable with the World War 2 Manhattan project. At this time the policy priority is action that encourages the early commitment of resources on this scale.

SUSTAINABLE AVIATION FUEL

13. The huge advantage of SAFs is that they are essentially 'drop in' and can be used, either in blends or, eventually 100%, in existing engines with only minor modifications. They are also available now, albeit in small quantities at a high price. Many organisations, including the IPCC, include scenarios which include a substantial contribution from SAF toward meeting the 2050 goal. The challenges to the SAF use envisaged are the availability of sufficient feedstock (including water), the adequacy of energy supplies for SAF manufacture, and the possible need for additional offsetting if these fuels do not form a circular GHG economy. All these challenges are the subject of intensive research.

14. In addition to the great potential value of SAF to the 2050 goal, if the challenges can be overcome the limited quantities already available can be probably be scaled up to be very valuable in the transition to 2050

OFFSETTING

15. Offsetting enables mitigation for emissions from existing operations, but the challenge is to ensure that the mitigation is genuine. Offsetting has evolved and is continuing to evolve to ensure that this is the case. It is important to ensure that the offset is genuinely additive and does not have adverse effect. Offsetting is a matter which relates to many more sectors than just aviation (and will therefore be in much demand), but there is clearly a range of mechanisms ranging from tree planting to the removal and storage of carbon from exhaust gases.

16. There are a number of mechanisms and regulatory controls on offsetting, such as voluntary schemes for passengers to select offsets, commitments by airlines to offset all flights, the UK Emissions Trading Scheme, and ICAO's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). The long term goal should be that all emissions are regulated through a worldwide scheme such as CORSIA, but it is recognised that this will take time and, to an extent, be determined by the need to achieve international agreement.

While some airports now have approval to expand, others have excess capacity which is probably not going to be required before 2050.

17. CORSIA, for all its current limitations, has significant international agreement and is currently in a pilot stage. There are opportunities to strengthen and develop CORSIA and we urge the UK Government to press strongly for its development over the years ahead, as it moves through its phases.

INTEGRATED POLICY

18. Aviation decarbonisation must, of course, be related to policies for transport and other areas. Other transport policies include decarbonisation of other modes and the provision of energy efficient surface access infrastructure. It is also important to align taxation and public funding policies across modes, so as not to distort competition. At a high level, spatial planning determines the strategy for expanding aviation infrastructure and for energy infrastructure such as fuel production facilities.

AIRPORTS POLICY

19. A particular element of spatial policy is airport policy, which is determined by the Airports National Policy Statement and the 'Making Best Use' policy, both of which have been tested at inquiries and in the courts. Thus far these airport policies have been shown to be aligned with climate change policy but there remains some uncertainty about future expansion proposals. The most recent DfT aviation forecasts date from 2017 and are in need of revision in the light of Covid-19, although this of course will be difficult until the pace of recovery is clearer. However, these forecasts also included airport capacity assumptions which have recently been revised such that the total UK demand and capacity assumptions can be compared. While some airports now have approval to expand, others have excess capacity which is probably not going to be required before 2050. Cargo forecasts are very limited and it would be very helpful to have UK-wide forecasts similar to those for passengers.

TAXATION AND CARBON PRICING

20. In order to achieve net zero emissions, it is important that the cost of those emissions is properly reflected in the price of aviation. Taxation is a blunt way of achieving this and should only be used on an interim basis until carbon pricing is fully implemented. Our response to the recent Treasury consultation on aviation tax reform supported an increase in the number of APD bands to better reflect carbon used. However, carbon pricing is the appropriate way to ensure that the cost of emissions is properly reflected. Whichever measure is used, be it in the cost of SAFs or offsetting through an ETS or CORSIA, the value will then be used directly in creating the required negative emissions, rather than just being taken by the Treasury as would the case with taxation. It is accepted that this would raise the price of air transport and, in turn, this would have some dampening effect on demand, but there would still be growth.

ROUTE TO NET ZERO 2050

21. CILT is in no doubt that transport needs to decarbonise rapidly and to achieve net zero by 2050, and aviation should play its full part in this journey. With rapid research, development and implementation of a range of measures net zero can be achieved by 2050 with significant reductions in the interim years. It is not possible to be precise about how much each measure will contribute towards the achievement of net zero, so it is appropriate to support and develop several measures and to adjust the strategy as their degree of success emerges. It is also important to ensure that early reductions are achieved, which means that some measures might be appropriate in the short term on an interim basis. In this scenario, aviation can continue to grow.

It is not possible to be precise about how much each measure will contribute towards the achievement of net zero, so it is appropriate to support and develop several measures and to adjust the strategy as their degree of success emerges.

ROADS AND TRAFFIC

Routes to Net Zero – COP26

Require all EVs and chargers to be standardised so that all vehicles can have access to all chargers

1. De-carbonising road transport requires changes on two fronts:

- Rolling out the provision of EVs and enough convenient charging points. With the use of hydrogen to fuel cars also a possibility, providing a sufficiently dense network of hydrogen filling stations might also be a requirement.
- Changes in travel behaviour, including mode shift.

ROLL OUT OF EVS

2. Achieving this goal presents a number of challenges for the Government:

- Convincing a sceptical public that there will be enough charging facilities to meet their needs both in cities and in rural areas and for longer inter-urban journeys.
- It is sensible to encourage smart, off-peak charging in order to reduce the load on the electricity supply industry and avoid extra demand requiring the use of fossil-fuel power stations, but
- People without off-street parking may have difficulty charging off peak and have to pay much more.
- Along parts of the major road network and in some rural areas the electricity distribution network may need expensive upgrading.
- The supply of EVs will depend in part on the success of the battery mega-factories the Government hopes to promote in the UK and the supply of metals and other materials used in battery and vehicle production. The extraction of some of these (copper, for example and aluminium) emits a lot of carbon.
- There may be a problem for the second-hand market, which is particularly used by poorer people because EV batteries at present wear out during the lifetime of the vehicle and are expensive to replace.

3. The Government needs to:

- Require all EVs and chargers to be standardised so that all vehicles can have access to all chargers.
- Ensure that people with off-street parking at home have access to smart electricity meters and off-peak tariffs.
- Require on-street providers to have low charges off-peak and access themselves to off-peak charges from their electricity supplier. As part of this the VAT rate for public chargers should be brought in line with domestic electricity – 5%.
- Ensure that where distribution networks have to be up-graded the cost is equitably funded.
- Introduce a clear overall plan and a regulatory framework within which both private sector and local authority providers of charge points can respond to market demand. There may be a role for Ofgem.

4. Local authorities need to

- Integrate the location of local charge points with parking policies and enable people to identify where a charger is available near their home and book a slot.
- Explore the possibility of installing pop-up chargers at the edge of pavements and supplied underground from fronting properties so that they can benefit from domestic off-peak tariffs.
- Ensure that where people living in narrow streets or in blocks of flats have to travel to a hub to charge their vehicle, it is within convenient walking distance.

The Government points out that over recent years buses have become more expensive and car use has become cheaper (partly as a result of the failure to continue increasing fuel duty at least in line with inflation).

BEHAVIOURAL CHANGE

5. The Government now acknowledge that EVs will not replace petrol and diesel vehicles quickly enough to meet the decarbonisation targets and that behavioural change will also be needed. But the incentives they propose are unlikely to achieve their desired objective:

- The Government strategy focusses on mode shift to walking, cycling and public transport (mainly buses), but
- Behavioural change also includes making shorter or less frequent journeys, ride-sharing and in the longer term land-use changes. The incentives provided need to cover these too.
- The Government points out that over recent years buses have become more expensive and car use has become cheaper (partly as a result of the failure to continue increasing fuel duty at least in line with inflation). Their answer is to make buses more convenient and cheaper.
- Better quality bus services (including priority bus lanes) must be part of the answer. But past experience and research show that sticks are needed as well as carrots to produce a significant effect. The initial experience with the successful introduction of the Central London Congestion Charge bears this out.
- The Government has said nothing so far on how lower fares and better services are to be paid for or how they propose to plug the £30billion hole in their finances as people switch from vehicles that pay fuel duty to EVs.
- The government points to the opportunities to switch shorter journeys to walking and cycling. But although these constitute a high proportion of trips they are a much smaller percentage of miles so the effect on congestion and emissions will be less.
- The policies and plans must recognise that the opportunities for modal shift can be very limited or, in effect, non-existent in rural areas and communities as well as in some outer urban areas.
- Failure to introduce a mileage charge to replace the income from fuel duty will reduce EV running costs and is very likely to cause an increase in car use – which is the opposite of what the government wants. The official road traffic forecasts estimate that by 2051 car and van mileage will be 19% higher as a result of the move to EVs. Congestion and non-tailpipe emissions from vehicles will also be correspondingly greater.

6. The logical answer to all these problems is to introduce a modern system of road charging to replace fuel duty but central and local government are well aware that outside central London this has proved to be unpopular in the past with no progress being made on introducing it for the last 20 years. However, there are some signs that there might be majority support for road charging of some form, particularly among younger people.

7. The Government therefore needs to promote an open public discussion of the options and which system would be most likely to win support and deliver real improvements on the ground. The main benefits likely to win support are

- Improvements in health, particularly for children, by reducing air pollution.
- Reducing carbon emissions and global warming.
- Replacing the multiplicity of charging regimes for exhaust emissions (plus, in London the congestion charge in the central area) by a single, user-friendly system throughout Great Britain.

- Making the charge reflect the damage caused, proportionate to mileage and with higher charges in dense urban areas and at peak times than in rural areas and smaller urban areas as well as in the off-peak.
- Avoiding the unfairness that will arise if EVs pay nothing towards the cost of wear and tear on the road system
- Reducing traffic growth and gridlock by charging all users by the mile and preventing the surge in traffic levels that will occur as drivers migrate to EVs which are not subject to fuel duty (about 7p a mile on average).
- Avoiding a £30 billion black hole in public revenues which will either cut the funding for transport improvements and other benefits or have to be replaced by large tax increases elsewhere.
- Although using peak pricing to reduce congestion is more difficult to explain; it is counter-intuitive to most people to charge more for a worse service, it is an established and accepted policy for airlines and inter-city rail travel. But it can be sold on the argument that all drivers otherwise face gridlock (the Tony Blair Institute argument) and that electronic charging enables drivers to respond to higher peak charges in the way that best suits them, including shorter and less frequent journeys, ride-sharing etc as well as mode shift; and that part of the income from charging could be used to compensate those who are hardest hit.

If fuel duty is to be varied with the introduction of road user charges, at least within Great Britain, all the nations will need to agree on the method of collecting those charges as well as the structure, if not the individual levels.

8. Technically it is now highly likely that an electronic charging regime could be introduced fairly easily, but there are a number of issues that need to be resolved:

- To avoid diversion from motorways and other main roads to environmentally less suitable alternatives any system needs to apply to the whole network, not just main roads.
- The basic technical system needs to be uniform across the whole of GB so that drivers are not faced with confusing differences in different areas (although the details of the level and time of charges may vary from place to place).
- To be fair to rural road users and to achieve a significant impact on congestion the system needs to register vehicle movements by distance, time and place. But a system that tracks vehicle movements in this way will raise privacy issues and will be controversial.
- In cities where peak charging will be necessary to reduce congestion it needs to be accompanied by improvements in public transport and other alternatives to the car (including walking and cycling). The details need to be tailor-made to each urban area – within a standardised overall technological system. Local authorities must have a key role.
- Installing tracking and enforcement over all roads would take time and be quite expensive. The best hope is that the use of GPS tracking will provide a reliable method. It is already fitted to all new EVs and many other new vehicles. To ensure that we are ready for such a regime should it be decided on, all new vehicles should be required to be so equipped, just as the Government propose to require all new gas boilers to be hydrogen-compliant.

Crucially, while transport is devolved, fuel duty is a UK wide tax policy. If fuel duty is to be varied with the introduction of road user charges, at least within Great Britain, all the nations will need to agree on the method of collecting those charges as well as the structure, if not the individual levels.

INCENTIVISING THE SWITCH TO EVS

9. In our paper for the Select Committee we suggested starting with a simple rate per mile, equivalent to the current level of fuel duty per mile for each class of vehicle could be introduced with fine-tuning later. This should be technologically simpler and therefore easier to introduce quickly and would help plug the hole in the government's finances.
It would also:

- Acclimatise people to the idea of paying for road use electronically rather than at the fuel pump.
- On average, cost road users as a whole no more at first than they pay now but would differentiate by vehicle type and distance travelled. It would, however, cost those with low consumption vehicles more and those with high consumption vehicles less.
- Be more targeted and efficient than ultra low vehicle areas whose charges do not reflect different mileages.

Edward Leigh's interesting submission to the Select Committee suggested self-reporting of mileage every month and paying in monthly instalments with a check at the annual MOT and any necessary adjustment (up or down).

10. We did not say much about how to roll out a progressively more complex system. The suggestions by David Begg for incentivising people to opt in for EVs and electronic tracking were silent on how it would be managed and enforced. Edward Leigh's interesting submission to the Select Committee suggested self-reporting of mileage every month and paying in monthly instalments with a check at the annual MOT and any necessary adjustment (up or down). We think this is too open to fraud and evasion, but could it be acceptable as a short-term measure to get the ball rolling? If there were then evidence of evasion it might increase public demand to do something about it, even perhaps electronic tracking!

11. Other suggestions made are giving drivers a choice between a fixed charge (perhaps including increased fuel duty) and opting in to electronic payment; like the Oregon system, which provides a fuel tax rebate to vehicles paying an electronic charge. The latter has been in operation for some years and is worth looking at in more detail to see how it is enforced.

12. It would be easier to introduce a full-blown system for freight vehicles (HGVs, LGVs and vans) as they are already GPS- tracked by the big companies. This might be acceptable provided that it was part of a plan to extend charging to all vehicles. Freight operators could get a fuel duty rebate. But there could be a problem of forcing it on smaller owner-driver firms and self-employed service providers, some of whom may not have GPS or might even still operate only in a cash-based society with no on-line banking. They could be given the opportunity to opt in (to get the rebate).

13. GPS tracking also works well in a number of taxi apps, including Uber and FreeNOW (one of the systems used by London black cabs). Both the driver and the passenger sign up to having their location and journeys displayed to the other and to the operator of the app; and to on-line payment by direct debit. Technically it should be possible for the government to introduce such an app for all road journeys (like the Covid app). But there would be serious privacy issues to resolve. Most people would probably accept it as a voluntary choice but it would be difficult to make compulsory. The tracking would also have to be tied to the identity of the vehicle, so that the level of charge can vary according to vehicle characteristics, not simply use the driver's smartphone.

The Government need to be honest with the public. Instead they run the risk of misleading (and antagonising) people by publicising the low running costs of EVs to encourage their purchase and making no mention of the need at some point to introduce electronic mileage charges.

14. Another way of encouraging people to buy EVs would be to increase fuel duty substantially. This would also reduce mileage, encourage hybrid owners to avoid using the petrol/diesel back-up and bring HMG extra income. Fuel duty has the great advantage of being cheap to collect and almost impossible to evade. The Government could announce that it intended to replace fuel duty with a mileage charge but that until agreement could be reached on the details of an electronic system the immediate environmental problem left it with no choice. There might be fuel rebates for drivers who opted to have electronic charging (a la Oregon). The freight industry could accept this idea and promote full distance, place and time charging for HGVs, LGVs and vans. There might be options to have rebates for rural drivers.

15. Ideally all new EVs should be required not only to incorporate GPS tracking (see para 8, bullet point 5) but also to incorporate some way of making it impossible to drive if the system is switched off or there is no on-line direct debit arrangement is in place.

CONCLUSION

16. The key, and most urgent, issue is for the Government to engage actively and as a matter of urgency with the public in the hope of getting them to accept that there have to be hard choices if zero carbon is to be achieved in the timescale required; and to explore what system of road charging, properly designed and operated would be the most acceptable, efficient and fairest system.

17. The Government need to be honest with the public. Instead they run the risk of misleading (and antagonising) people by publicising the low running costs of EVs to encourage their purchase and making no mention of the need at some point to introduce electronic mileage charges. Unless this is made clear either purchasers of EVs will cry foul or it will be impossible to introduce charging because of the outcry.

BUS AND COACH

Routes to Net Zero – COP26

Bus and coach services have much to offer in the drive towards Net Zero. Firstly, vehicle builders are leading the way in moving from diesel (even Euro VI which represents a significant step forwards) to electric, hydrogen and biogas buses and coaches. Secondly – and more significantly – passenger transport offers huge opportunities to provide an alternative to car use. It is this shift from car to bus and coach which will make the difference between traffic congestion and reliable road journeys, from parking pressures to easy access to urban centres, from wasteful personal transport to high quality mass transit and from impenetrable housing estates to truly accessible developments.

CLEANING UP

New fuels are being deployed at an accelerating rate including fully electric buses, hydrogen vehicles for longer journeys and on a lesser scale biofuels.

Buses and coaches are now far less polluting than they were. Emissions from diesel engines have been reduced substantially and as older vehicles are withdrawn, more of the fleet will be low- or zero-emission. However, new buses are more expensive than conventional buses and are expected to be in service for many years and for coaches, even longer. This means that the vehicle purchase decisions of today will be with us for up to twenty years. New fuels are being deployed at an accelerating rate including fully electric buses, hydrogen vehicles for longer journeys and on a lesser scale biofuels. Each represents significant progress and the uptake continues to increase. Buses and coaches with much improved emissions, especially particulates, to rivel or better those from diesel cars. Some interesting innovations have emerged such as mounting a filter mechanism on a bus roof which cleans the air as it moves. In replacing car journeys, buses and coaches remove polluting vehicles and the congestion associated with them.

The Covid-19 pandemic destroyed much of the demand for bus and coach services, some of which it has yet to recover. However, there have been some positives including widespread recognition of the significance of bus services, not just as transport for key workers. Also, passenger information systems have adapted to show not only where the bus is but how full it is. With enhanced cleaning regimes, buses and coaches remain extremely but this message needs to permeate the travel decisions of the majority.

ATTRACTIVE BUS AND COACH SERVICES

For transport, the decarbonisation aspirations need more emphasis than they have achieved to date. We know the problems driving Net Zero are acute and that transport has a key role to play within which the bus and coach sector is a valuable part. We know that bus services take people to where they need to be on a daily basis but are undermined by traffic, mainly cars. People will not make the necessary shift unless bus services are punctual and predictable. We welcome the national bus strategy for England which addresses this issue and the wider agenda of how bus services can be made attractive to people who are habitual car drivers and have little or no idea about what bus and coach services can do for them. Elsewhere in the UK, similar initiatives are promoting bus use. There are some good examples of what can be achieved where bus service providers, highway authorities and others work collaboratively to make services attractive. This results in a tempting proposition that can appeal widely and evidence of where strong initiatives have been implemented that many users have a car available for that journey but have chosen to use the bus or coach service.

There are some good examples of what can be achieved where bus service providers, highway authorities and others work collaboratively to make services attractive.

The potential for supporting decarbonisation is huge in that bus and coach journeys offer a high capacity alternative to car use. A modern bus can carry up to 80 people and is accessible for everyone including wheelchair users. Recruitment and training is underway so that staff better understand the needs of all users including those who have mobility, eyesight or aural impairments. The majority of journeys in the UK are made by car so the main effort should lie with passenger transport, not promoting unrestrained car use. This highlights the contradiction of supporting mass transit while funding vast road capacity increases – some unpopular decisions need to be made if Net Zero is to be achieved. Thinking ahead about the climate, environmental, economic and social impacts of change requires decisions today. If even a small proportion of journeys are transferred, particularly local journeys such as getting to work, then the impacts on the environment and health will be significant. Fewer cars, particularly diesel and petrol cars, must be the way forward. The bus and coach sector offers high quality services, boosted by government's recognition of their critical role to economic success. Bus services take people to work, to training and to high streets but need greater emphasis on making them better.

Many car users have never used bus and coach or have not done so for a long time; this needs to change. The services available are adapting to a post-Covid economy so that people will be able to travel without relying on a car and the congestion and pollution that goes with it. Hence the decarbonisation plan needs to focus on sustainable travel options, not on replacing cars with cars. Simply investing in electric cars is an opportunity squandered because they are yet to become affordable to everyone and they use valuable and finite resources in battery manufacture. Electric cars will not solve congestion or the demand for parking spaces in urban areas. Shifting the emphasis towards essential activities such as delivery of goods and better bus and coach services will ensure that the resources available will be deployed efficiently. This will also reduce pressure on the energy sector for which more generation of electricity and creating an expanded distribution network creates huge challenges and costs.

The whole bus and coach experience needs to be revitalised – the quality of scheduled coach services in terms of reliability, passenger comfort and price is far removed from the popular perception. Similarly, bus services are safe and are designed to make journeys easy and comfortable. Efforts are being made to address wider aspects including information about services (fixed and live), the range of tickets and how to pay for them including mobile phone payment and contactless cards, better bus stop facilities and other improved passenger experiences. Once people have discovered that they are not as dependent on car use as they thought, or find that car is no longer an option for them, then buses provide vital transport connections.

BEHAVIOURAL CHANGE

If bus and coach services are improved to meet more people's needs, then urban centres can be revitalised, housing and commercial developments will feature buses rather than car parks and changing work patterns can be addressed. Buses are a flexible form of transport in that they can change as the market demands rather than being confined to specific infrastructure. They can get individuals to the rail station, the shops and for a multitude of work and leisure purposes. However, this is based on an upward spiral of more users and better services so getting habitual car users onto buses and coaches is the sensible route to take. In areas where buses are popular, growth in demand is being achieved with consequent benefits for individuals, society and communities as a whole. Buses and coaches are very much part of the solution but need to be recognised and promoted.

A combination of actions will help change perceptions so that bus services can work better. This includes infrastructure and a concerted effort to redefine what streets are for with more space for passenger transport and other non-car modes. Old traditions of providing car parking, blaming others for congestion and prioritising car movements need to be challenged. This then needs to be translated into actions that enact policies that work towards Net Zero.

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ACCESS AND INCLUSION

Decarbonisation and issues for disabled and older people

Routes to Net Zero – COP26

For those people who need door to door mobility the car is a lifeline. Policies such as those already in place to exempt disabled drivers from Congestion Charges in major cities will need to be adopted more widely to avoid penalising those who are often on low incomes and for whom no alternative exists.

In the drive to decarbonise road transport it is important to remember and provide for the particular needs of the large and growing global population of older and disabled people. If these needs are overlooked, millions of people will be disadvantaged and potentially will lose their independent mobility – at significant cost both the individual and the state.

Key points are:

- Current designs of electric cars are often incapable of adaptation to the needs of disabled drivers and passengers. The size and placement of the battery, for example, make it impossible to modify vehicles needing a dropped floor or ramp installation to accommodate a wheelchair user. Future designs need to take account of this requirement. The European Commission's Motor Vehicles Working Group is aware of this issue through the European Mobility Group (a trade association representing manufacturers and adapters of vehicles for disabled people). A number of UK specialist vehicle converters are also working on the problem.
- Almost silent electric vehicles present a significant safety risk to pedestrians with vision impairment unless some identifiable noise is built into the design.
- Most current designs of public electric charging points are unusable by many disabled and older people, including wheelchair users, for example. They are located too high, are too heavy and require fine manual dexterity. Work to identify the issues and to propose design solutions is underway in the UK through Motability and is under review in Brussels and elsewhere.
- Many on-street charging points present a trip hazard to pedestrians with low vision (and those intent on their mobile phones).
- Policies and regulations to discourage or charge for private car use need to take account of disabled and older people who are unable to manage long distances on foot or to access or use public transport. For those people who need door to door mobility the car is a lifeline. Policies such as those already in place to exempt disabled drivers from Congestion Charges in major cities will need to be adopted more widely to avoid penalising those who are often on low incomes and for whom no alternative exists.

For more information on CILT's Route to Net Zero campaign:

www.ciltuk.org.uk/routetozero

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ROUTES TO NET ZERO 2050

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