



The Chartered
Institute of Logistics
and Transport



ROUTES TO
NET ZERO
2050

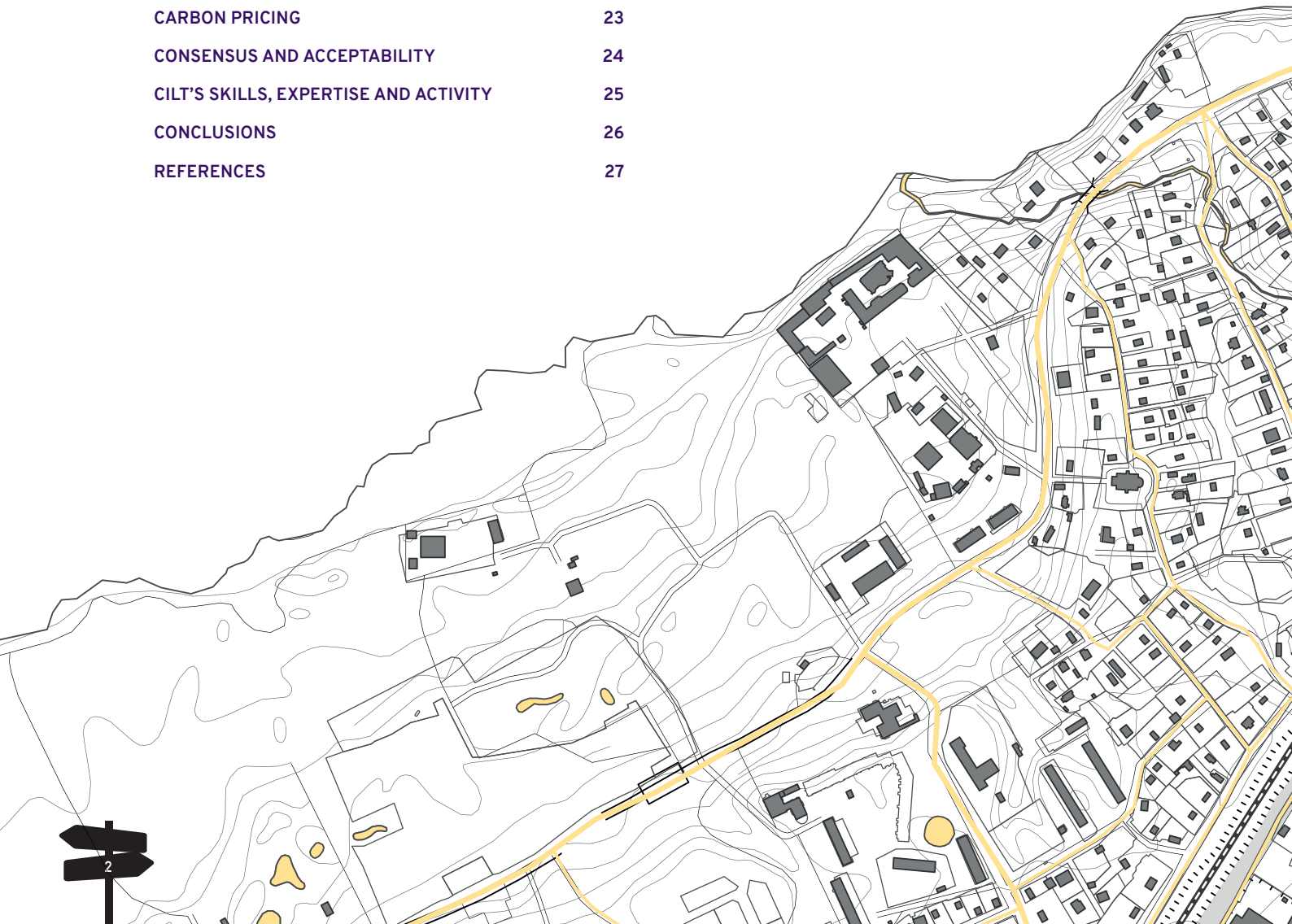
ROUTES TO NET ZERO 2050

2020 YEAR-END SUMMARY REPORT



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SUMMARY

This report summarises the work of CILT over the last year on transport decarbonisation and is intended to update CILT members, government ministers and officials, industry and other interested parties.

Through 2020, UK governments and their agencies and advisers have published studies, consultations, and statements and these together with parliamentary inquiries, work by international and industry bodies, and academics have been considered, leading to proposals and recommendations for policies to be promoted by CILT.

Recommendation 1

The UK should use the opportunity of the UN Climate Change Conference in Glasgow in 2021 (COP26) meeting in Glasgow and the chairmanship of the G7 in 2021 to persuade other nations to set targets and measures required to achieve major sustainable progress towards climate change and net zero carbon emissions.

We welcome the UK government's Ten Point Plan for a Green Industrial Revolution published in November 2020. Three of the points directly relate to transport and we acknowledge and support these in this report. The other seven points are all relevant to transport, in particular those relating to green electricity generation, low-carbon hydrogen, carbon capture usage and storage, and green finance and innovation.

This report focuses on carbon, but acknowledges other environmental impacts from transport. There is also a clear link between transport and land use, but this has not featured heavily in our work. The report

also notes autonomous and connected vehicles, but suggests that these are not directly linked with decarbonisation.

Transport currently accounts for 28% of UK domestic emissions. Covid-19 has reduced travel well below 2019 levels, in some sectors more than others. This will help in achieving the carbon budget for 2018–22 (CB3), but a recovery is expected (albeit with some changes in travel patterns) and to achieve net zero by 2050 and early reductions for 2030 will require a range of measures. These measures are described individually, but there is a recognition that they must be considered in the round as part of an integrated approach to transport and within the overall decarbonisation agenda.

Recommendation 2

Government should set carbon budgets for the transport sector, and possibly subsectors such as aviation, aligned with the UK total carbon budgets.

There are existing lower carbon fuels and a range of new fuels are being developed, for aviation, HGVs, buses, coaches, trains and ships. Hydrogen is also being developed as a fuel, as well as a source for fuel cells. Hybrid vehicles for both road and rail vehicles are not zero carbon.

Recommendation 3

Government should continue to mandate the use of lower carbon fuels and should support the development of plants producing sustainable fuel from waste.

Recommendation 4

Some hydrogen production, provided its green credentials can be proved, should be allocated to transport uses, but not for cars or vans.

Recommendation 5

Plug-in hybrid vehicles should continue to be produced until 2035, provided they demonstrate zero emissions in actual operations.

While not the only solution by a long way, electrification is the single most important measure for transport decarbonisation, as it embraces the largest source of emissions – cars and vans – as well as one of the most difficult sectors, aviation. It will also enable rail to be the lowest emitting form of transport for passengers and for freight once the rail network is substantially electrified. We recognise the need for green electricity, distributed at the right time, and the challenges of battery production.

Recommendation 6

Overnight charging should be incentivised by the continuation of the government plug-in charging grant and the pricing regimes of electricity suppliers, which should be enforced by the Regulator.

Walking and cycling are zero-carbon modes, and electric assistance is very useful, but we remain concerned about e-scooters.

Recommendation 7

E-bikes should be supported, but e-scooters should not be permitted on footways.

We welcome and support the Ten Point Plan point 4, which includes the ending of the sale of new petrol and diesel cars by 2030 and hybrids from 2035. The biggest challenge is to provide charging facilities at homes, car parks, workplaces and service areas. The private sector will provide charging points (as they currently do for petrol and diesel), but policy must be clear.

Recommendation 8

All new developments (except car-free developments) must include electric charging points in order to gain planning permission. For urban developments of high-rise or terraced housing the requirement should be that a proportion of convenient off-street parking places are provided with charge points. For existing residential areas without off-street parking, a proportion of on-street parking should be provided with charging facilities.

We welcome and support the Green Industrial Revolution point 5 on green public transport. Buses can also be electric powered, but the cost of upgraded electricity supplies must be spread. Light vans and smaller lorries can be electric powered, but we do not expect the same for HGVs before 2050.

Recommendation 9

Energy suppliers should spread the cost of upgrades between immediate and future customers.

Recommendation 10

All home deliveries should be undertaken by electric vehicles by 2030.

Passenger rail is already the most electrified mode of transport and the rail network can be further electrified to enable rail freight to be similarly powered, with branch lines and short last mile sections being used by battery or hydrogen-powered trains.

Recommendation 11

Whichever pathway is selected, a rolling programme of rail electrification should be implemented to follow the delivery of schemes in CP6 (2019–24), with priority given to links between container ports and inland distribution centres. New diesel-only trains should not be produced or introduced from now on. Diesel-only trains should be withdrawn by 2040, and bi-mode or tri-mode trains should have their diesel engines removed as the infrastructure is electrified, but in any event by 2050.



Aviation electrification is in the early stages of development, but progress has been rapid. Battery electric aircraft have flown, and some small types are in production, with service planned for the next few years.

Recommendation 12

Government should continue to support industry development of electric aviation, with 10 times the amount already announced for the Aviation Technology Institute and Whittle Lab.

Recommendation 13

Governments should support a trial of electric aircraft on a set of regional routes.

One of the earliest ways of reducing carbon from transport is by making journeys by existing zero or low-carbon instead of high-carbon modes. We particularly welcome the commitment in the Ten Point Plan to green public transport, cycling and walking. Caution should be exercised when plans for shared road use or low traffic neighbourhoods are brought forward, to ensure that pedestrians are safe, that emergency and service vehicles can gain access and that public transport is not compromised.

Recommendation 14

Local authorities must prepare Active Travel Plans that take account of the needs for servicing delivery, emergency access and disabled people, by 2025.

Recommendation 15

We welcome the commitment to green public transport in the Ten Point Plan and recommend that these measures are implemented without delay.

Public transport has been badly affected by Covid-19 and the Green Industrial Revolution point 5, while noting investments in public transport, does not consider how it can recover and avoid a carbon-intensive, car-led recovery.

Recommendation 16

As the Covid-19 pandemic recedes, government, local authorities and operators should communicate the safety and environmental benefits of public transport.

Even before rail is fully electrified, shifting freight from road to rail will contribute to early decarbonisation efforts, increasing as electric trucks take over deliveries. For local deliveries, cargo bikes and other zero-carbon modes will require local logistics hubs.

Recommendation 17

Governments should support modal shift to rail freight with targeted interventions.

There are significant differences between urban and rural areas when it comes to how best to deliver zero-carbon transport. Active travel and public transport are particularly suited to urban areas, but less so in rural areas, which also have different economies.

Transport providers are constantly striving for efficiency that can contribute to reduced emissions, albeit in a small way. Better use of road space or airspace and car-sharing are examples. Removing bottlenecks can improve efficiency, but the benefits must outweigh the adverse effects of generated new trips. Better efficiency of road use can be achieved by a well-designed road pricing regime.

CILT members devote themselves to making transport better, and are thus unlikely to recommend reducing travel, whether for business, leisure, education, visiting friends and relatives, or for transporting goods. Local sourcing of goods is helpful, but distance is not necessarily a good measure of emissions. Rationing would be inequitable and open to abuse and should not be a permanent measure. Neither would we support doing nothing and allowing congestion to rule. Taxation is possible and already exists, and we have long supported a well-designed form of road pricing to raise taxes to pay for transport in such a way as to make better use of capacity.

For the carbon that cannot be reduced to zero, offsetting is a legitimate measure that is well established and can be used in the short and the long term.

Recommendation 18

The UK government should use its position as the host of COP26 to ensure that agreement is reached on how to verify international offsetting schemes.



Taxation is a major element of transport costs and can be used to affect the amount and timing of travel, and carbon emissions. CILT has been a longstanding supporter of road pricing as the way to use road capacity better, by sending signals to motorists and hauliers that encourage the use of capacity when it is available. Taxation can have adverse consequences and the current Air Passenger Duty regime restricts regional air connectivity.

Recommendation 19
The UK government should use its position as the host of COP26 to ensure that agreement is reached on how to verify international offsetting schemes.

Recommendation 20
The government should amend Air Passenger Duty on flights between the four home nations to reduce the adverse effect on regional air connectivity.

Transport is used by everyone and every journey has different needs. People are used to their existing journeys and will be fearful of change, even change for the better. There will be winners and losers, so it is important to ensure that fairness is perceived and understood.

Recommendation 21
Government, with the support of transport organisations, including CILT, should engage with the wider public to monitor attitudes and undertake long-term campaigns to persuade people of the benefits of various changes, such as road pricing, electrification, active and public transport, as appropriate to particular geographies, social and age groups.

CILT is a leading, independent voice covering all modes and not aligned with any particular viewpoint. We will continue to study and advise based on our knowledge and expertise, drawing from our membership. Over the next year or so, we intend to contribute further to the transport decarbonisation debate.

INTRODUCTION

The purpose of this paper is to update CILT members, government ministers and officials, industry and other interested parties about the CILT's studies of transport decarbonisation.

During 2020, CILT has reviewed evidence and participated in events that enable a view to be reached on how to decarbonise transport in the UK. Participation has come from individual members and from various regional and local groups, modal forums and policy groups, coordinated through CILT's Public Policies Committee.

UK government activity on transport decarbonisation has been mainly through the Department for Transport (DfT), although there is significant cross-departmental activity on decarbonisation generally. DfT published *Decarbonising Transport: Setting the Challenge*¹ in March 2020 and, following a series of workshops in July and August, published a *Transport Decarbonisation Plan Update* in October.² The DfT issued a Call for Ideas in July.³ The government has established the Net Zero Transport Board to enable it to receive advice on transport decarbonisation and has also set up the Jet Zero Council. On 18th November 2020, the Prime Minister outlined a Ten Point Plan for a Green Industrial Revolution, which included an end to sales of new petrol and diesel cars by 2030 and hybrids by 2035, support for public transport and active travel, and the Jet Zero and maritime initiatives, alongside other measures on green electricity, hydrogen and carbon capture technologies. On 12th December the, Nationally Determined Contribution was announced, whereby the UK will reduce carbon emissions by

68% by 2030 compared to 1990 levels.⁴ On 24th November, the outcome of the Future of Transport Regulatory Review was published, alongside a Call for Evidence on Rural Strategy and a Future of Transport page with research and analysis. We anticipate further government announcements in the near future, on a transport decarbonisation plan, an aviation recovery plan, a national bus strategy and other matters.

In parliament, the Transport Select Committee has undertaken or is undertaking inquiries related to transport decarbonisation, including on reforming public transport after the pandemic and trains fit for the future. Six Select Committees jointly set up the Climate Assembly UK which published a report in September 2020.⁵

The Scottish Government's National Transport Strategy has a 2045 target for net zero transport carbon emissions supported by work to decarbonise Scotland's passenger railways by 2035 and scheduled flights within Scotland by 2040.⁶

The Committee on Climate Change (CCC) published its *2020 Progress Report* in June 2020⁷ which included a number of transport recommendations, including on active travel and public transport, cars and vans, HGVs, rail, aviation and shipping. In December 2020, the CCC published its advice to government on the sixth carbon budget.⁸



Many UK companies, industry groups, academics and others have issued reports of studies or plans for action, too numerous to reference here.

Although this study focuses on UK action, much transport activity is international – for example, aviation, shipping, vehicle manufacture – and of course climate change is an international issue relating to the global climate. UN activity is through the International Panel on Climate Change and also through organisations such as the International Civil Aviation Organisation (ICAO) and the International Maritime Organisation (IMO). Agreement has been reached through ICAO for the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and the IMO has agreed a target of reducing emissions from shipping by 50% from 2008 to 2050. COP26 will be a significant event in determining international action. While the UK is at the leading edge of climate action, the efforts of other countries should be recognised, such as China’s pledge to be net zero by 2060. The impact of a new administration in the USA is yet to be seen.

Recommendation 1

The UK should use the opportunity of the UN Climate Change Conference in Glasgow in 2021 (COP26) meeting in Glasgow and the chairmanship of the G7 in 2021 to persuade other nations to set targets and measures required to achieve major sustainable progress towards climate change and net zero carbon emissions.

We anticipate further government announcements in the near future, on a transport decarbonisation plan, an aviation recovery plan, a national bus strategy and other matters.



SCALE AND TIMING

The unusual circumstances of the 2020 Covid-19 pandemic mean that, while 2019 can be taken as a base year, forecasts of the recovery and future growth of transport, at least in the short term, are virtually impossible, although scenarios can assist in searching for policies that will work in a range of futures.

The Covid-19 pandemic has reduced travel significantly, but road traffic is least affected (70–90% of 2019), while public transport is 30–60%. Cycling is greater than 2019, but very variable. Air passenger trips are most reduced, at about 20% of 2019 levels. Freight transport is around the same levels as 2019, with van and HGV numbers slightly up and a shift from hospitality to home delivery. Rail freight is at about the same level. Air freight and shipping are both down on 2019.

In 2018, UK domestic carbon emissions were 451 metric tons of carbon dioxide equivalent (MtCO₂e). The carbon budget for 2018 to 2022 (CB3) is 500MtCO₂e per year (which allows headroom for international aviation and shipping) and the outcome is likely to be within this. A straight line to achieve net zero in 2050 is below the carbon budgets for 2023 to 2027 (CB4) and 2028 to 2032 (CB5), as shown in Figure 1.1 of the CCC's 2020 Progress Report. Because carbon emissions are cumulative in the atmosphere, it is more important to achieve early reductions, even if this at the expense of a net zero target date of 2050. Nevertheless, this paper looks to 2050 as a time horizon that is sufficiently far ahead for significant change to have happened, while still being just about within sight.

Transport emissions were about 126MtCO₂e in 2018 and 2019. Cars contribute 56%, vans 16%, HGVs 17% buses and coaches 3%, passenger rail 1.4%, rail freight 0.3%, domestic aviation 1.5%, and domestic shipping

1.3%. In addition international aviation emissions were 37MtCO₂e and international shipping 8MtCO₂e.⁹

Forecasts of the growth of travel have been largely invalidated by the Covid-19 pandemic, at least in the short and medium term. CILT's view is that transport is an inherent part of social and economic activity and, whether social and economic growth is in terms of quantity or quality, the demand for transport for people and goods will grow. Some activities may be permanently changed by the pandemic, the most obvious example being commuting, being partly replaced by working from home. This has potentially positive effects, reducing the demand peaks associated with commuting and enabling transport infrastructure to be used more efficiently. However, we do not expect leisure travel or visiting friends and relatives to be permanently reduced and it should return to 2019 levels in two to five years, with long-term growth continuing thereafter with, of course, occasional shocks. For freight, we expect to see continued short-term growth in the demand for goods and services. Over the longer term, the shift towards home delivery needs to be better understood and managed, as does the continual increase in the overall demand for goods. It is this long-term demand for transport that requires a combination of measures, including mode shift, technology, regulatory review and market-based measures, to ensure that emissions remain within carbon budgets.

Early emissions reductions

Because climate temperature depends on the total amount of carbon in the atmosphere, it is important to achieve early reductions in emissions. As transport emissions have not reduced as much as some other sectors in recent years, immediate action must be taken such as a shift to low-carbon modes, before technical improvements can be widely implemented.

The earliest large shifts to low-carbon modes can be achieved by using petrol and diesel cars less and replacing these journeys with active travel and public transport. For freight, deliveries and servicing, zero-emission vehicles should be used and loads transferred to rail or water where practicable. Policies to increase active travel in urban areas are being implemented and can be consolidated where they can be shown to result in improvements. The urgent need, once the pandemic is under control, is to enable a return to public transport by a campaign to encourage bus, coach, tram and train use, coupled with messages that motoring will be progressively more expensive.

There is of course a dilemma in supporting immediate action, which is that it might delay more substantial improvements. However, as these substantial improvements often require significant time to implement, it is better to obtain even small benefits now.

It is important when accounting for carbon emissions from transport to ensure that proper account is taken for both operational and embedded carbon, the latter from the creation of new infrastructure or new vehicles and batteries, as well as appropriate allowances for electricity generation or the production of other fuels. On the other hand, care must be taken to avoid double counting, such as emissions in other countries that relate to UK activity.



OTHER ENVIRONMENTAL IMPACTS

This paper focuses on carbon emissions, but transport has other environmental impacts, including local air quality, noise, water pollution, road safety and heritage.

The encouragement of diesel cars in order to reduce carbon emissions but which resulted in worsening air quality is an example of how unintended adverse effects can occur. Carbon emissions currently are seen

as having the highest priority, but care should be taken with policies and implementation to ensure that other effects are taken into account.



INTEGRATION WITH LAND USE

Some travel is a leisure pursuit in its own right (cycling, walking), but mostly it is derived as a result of other activity, although the interaction between transport costs, journey lengths and warehouse sites may determine freight transport demand.

The location of activity is determined by land use, which tends to be long term, given that facilities in which the activity takes place are buildings or other permanent places. While land use planning has always considered transport, it is certainly true that during some periods the plans were based on predominantly road-based transport. However, there are numerous examples where new sustainable transport infrastructure is being provided alongside new homes or commercial developments, such as new or reopened rail stations, intermodal freight depots, bus rapid transit systems, and mixed use activity zones near HS2 stations. A key element that still needs to be recognised and planned for is logistics land use for last mile deliveries.

Changes to the planning system are being implemented, primarily to make it simpler and to enable the building of many more homes. This represents a once-in-a-lifetime opportunity to ensure that homes are built in such a way that the transport associated with them can be provided in a decarbonised way. One example would be the creation of car-free residential neighbourhoods where as a condition of occupancy car ownership is not permitted. The reduction in city and town centre office and retail activity provides another opportunity to re-purpose town centres with more residential and amenity activity for which existing transport arrangements can be adapted. CILT has submitted a response to a recent Ministry of Housing, Communities and Local Government consultation on planning for the future, which called for a higher priority to be given to transport in planning.

We have a once-in-a-lifetime opportunity to ensure that homes are built in a way that the transport associated with them can be provided in a decarbonised way.

AUTONOMOUS VEHICLES

Technological developments in automation have continued in parallel with decarbonisation technology. However, there is no inherent link between automation and decarbonisation, other than perhaps a minor effect on energy use by engine or motor management. It is therefore not necessary to consider automation in detail in this paper, except to note a few examples.

Automation in rail is already in operation, wholly or partially, in some metro systems, but is not yet developed to enable wider use. Trials of autonomous and connected cars and vans are taking place around the world, with the main benefits said to be in improved safety and possibly in social mobility. The downsides are related to security, liabilities and the potential increase in trips and congestion. There have been trials of autonomy in HGVs – for example, platooning – and it is possible that motorways will be the first roads on which automation will be implemented, although it is difficult to see implementation by 2050. The efficiency of robots for deliveries in urban areas and the ability to share footpaths with people walking has yet to be proved, but drones may be appropriate in remote locations. Automation in aviation is long established and contributes to reduced emissions through better flight management, but the recent Boeing 737MAX situation, where the passenger airliner was grounded worldwide after 346 people died in two crashes, provides a salutary lesson in not understanding the risks of automated systems.



MEASURES

Measures in the round

The measures set out in this report are listed in relation to their power source and mode. However, there are inevitably some interdependencies and conflicts, so it is important to consider the whole package to ensure that there is a good balance. Several examples of conflicts are covered elsewhere and may point to decisions needed that give priority to one measure over another. The important point is that the totality of the measures results in the objective of keeping within carbon budgets and achieving net zero by 2050. Total carbon budgets for the UK are now well established and enshrined in law. It would be possible to divide up the total UK budget into sectors, or even subsectors, in order to understand better how the total is being used.

The Green Industrial Revolution document published in November 2020 includes commitments to a transport decarbonisation plan and a net zero strategy. These should go some way towards showing the interrelationships between sectors, but, in addition, the transport plan needs to set out specific budgets and targets.

Recommendation 2

Government should set carbon budgets for the transport sector, and possibly subsectors such as aviation, aligned with the UK total carbon budgets.

Total carbon budgets for the UK are now well established and enshrined in law.

Sustainable fuels

If there was a zero-carbon fuel, there would be no need to decarbonise and we could continue to use internal combustion and turbine engines. There is, of course, no zero-carbon fuel, but there are fuels that emit less carbon during production or combustion. E10 petrol and Euro VI diesel are short-term steps that will provide a small but quick win. Aircraft are already using small amounts of biofuel, and the aviation industry is investing in plants to produce jet fuel from waste, thus avoiding the problem of using land that could otherwise be used for food production for fuel feedstock. Aviation is likely to need sustainable fuel in the longer term, given that electric aircraft are unlikely to be able to operate on long-range routes. We welcome and support the Green Industrial Revolution point 6 proposals for sustainable aviation fuels. It is possible that similar fuels may be used in long-distance coaches and HGVs, and possibly for shipping, as also noted in the Ten Point Plan.

Recommendation 3

Government should continue to mandate the use of lower carbon fuels and should support the development of plants producing sustainable fuel from waste.

Compressed natural gas is being used by at least one bus operator and is sourced sustainably and results in reduced maintenance costs, but the setup costs may be a barrier to further use. Liquefied natural gas used in shipping produces 15–29% less CO₂ and is therefore a transitional fuel that can be used in the short term.¹⁰



Hydrogen can be considered as a sustainable fuel that can be used in modified turbine and internal combustion engines. However, the main challenges with hydrogen are the carbon used in production, and then distribution and storage. Hydrogen production requires large amounts of electricity and it is therefore important that this electricity is green. Hydrogen then has to be stored and distributed at low temperature and under high pressure, and vehicle fuel tanks have to be similarly suitable. The volume required for tanks is much larger than oil-based fuel. We note that hydrogen production is one of the 10 points in the Green Industrial Revolution announced in November 2020, but that its main use would be in domestic heating and cooking. There are possible transport uses and several concepts and trials are under way, for hydrogen-powered trains, buses or aircraft, and shipping could also by hydrogen fuel cell systems.

Recommendation 4

Some hydrogen production, provided its green credentials can be proved, should be allocated to transport uses, but not for cars or vans.

Hybrid vehicles

Hybrid vehicles are now well established as cars, hybrid buses and bimodal trains are in service. We welcome the government policy in the *Green Industrial Revolution* that hybrid cars and vans should have significant zero emissions capability by 2030 and 100% zero emissions from 2035. We recognise that hybrids are cheaper than all-electric vehicles and therefore more likely to be used. However, currently, the carbon reduction potential of hybrids is limited by their operating programmes, which, because of ‘range anxiety’, often use their internal combustion engine (ICE) for many journeys or parts of journeys where the battery is adequate. The reference to ‘significant zero emissions capability’ should instead refer to ‘zero emissions in actual operations’.

Recommendation 5

Plug-in hybrid vehicles should continue to be produced until 2035, provided they demonstrate zero emissions in actual operations.

Electrification

Electric power is the single most effective means of decarbonising transport. It can be used for road, rail and air transport. We welcome the government’s announcements in the *Ten Point Plan for a Green Industrial Revolution* relating to ‘gigafactories’ for battery production, accelerated rollout of charging infrastructure and plug-in vehicle grants. Electrifying mass transport and distribution will deliver vastly improved services and should be given priority in terms of battery production.

Green electricity

Electric cars and vans will not result in decarbonisation if the electricity generated is from fossil fuels. Electricity generation is outside CILT’s expertise, but we note the continuing trend towards green electricity and assume that there will be enough for transport.

CILT expertise can assist in understanding when electricity will be needed for transport. For road vehicles, most charging can take place overnight, either at homes or in depots. As well as being off peak in terms of generating capacity, this might also provide an element of storage that can be fed back into the grid if not required for transport. Some charging may take place during the day, at workplaces, shopping centres, railway stations, airports, etc. We welcome the Green Industrial Revolution commitment to invest in charging infrastructure.

Recommendation 6

Overnight charging should be incentivised by the continuation of the government plug-in charging grant and the pricing regimes of electricity suppliers, which should be enforced by the Regulator.

Electricity for rail is required at the time of travel, which is mostly during the day for passenger services, but may be more spread throughout 24 hours for freight.

Electric aviation is likely to be mostly based on batteries, so, as with road vehicles, charging will be at off-peak times. However, peaks in the aviation industry differ from road traffic, with longer days and weekends being busier and a different summer/winter profile.

While walking and cycling are zero-carbon modes, they are range limited and cycling, in particular, is a perceived challenge for many less fit people. Electric assistance for bikes, and novel modes such as e-scooters, can extend the range or make cycling more attractive. However, while e-bikes encourage physical activity, e-scooters do not and may also be a hazard to people walking and especially to disabled people. We note the summary of responses on micromobility in the Future of Regulatory Review outcome published on 26th November 2020 and await a further statement on Highway Code changes, but remain concerned about e-scooter safety. The next steps are primarily for trials and these will need to be rigorous if e-scooters are to be legalised.

Recommendation 7

E-bikes should be supported, but e-scooters should not be permitted on footways.

Electric cars and vans are now widely being produced and sold. Questions that remain include:

- Should petrol and diesel cars be completely banned at some future date?
- Will there be sufficient charging infrastructure?

CILT's view is that 2030 is an appropriate date for the end of the sale of new pure petrol and diesel cars and vans in the UK. Our view on plug in hybrids is noted above. The normal turnover of vehicles will result in a reducing number of petrol and diesel cars in use, combined with a reduction in fuel availability. As this will be taking place in the later years towards 2050, it is therefore not necessary to set a date at the present time for banning pure petrol and diesel cars.

For private cars, the primary means of charging will be at home. This is particularly suitable for homes with garages or private drives/parking spaces. For homes without dedicated parking, charging facilities must be provided in streets or communal parking areas. More clarity is required on the interaction between provision of charging points and residential parking permit regimes to avoid the sort of problem reported from Portsmouth. Charging facilities should also be available at parking locations such as workplaces, shopping centres, rail stations and airports. There remains a question about charging facilities replacing petrol stations. Motorway service areas or similar places with multiple facilities – for example, restaurants – are suitable locations for charging, although here they should be of the rapid-charging type. The ability to charge in the same time as filling with petrol is likely to be limited and so motorway service areas may need to be expanded or provided with multi-storey facilities. The DfT should explore the possibility of simplifying or accelerating planning

permission for this. The area devoted to petrol and diesel pumps is likely to decline, but must be maintained at a level to meet declining demand. The private sector can be expected to provide charging points, with local authorities setting local policy under national guidelines.

Recommendation 8

All new developments (except car-free developments) must include electric charging points in order to gain planning permission. For urban developments of high-rise or terraced housing the requirement should be that a proportion of convenient off-street parking places are provided with charge points. For existing residential areas without off-street parking, a proportion of on-street parking should be provided with charging facilities.

Local urban buses can be electric powered, and there are trials in several cities. A specified route and limited mileage, with a return to depot at night, makes this operation suitable. Capital costs are currently more than for diesel buses, but operating costs are lower. There is a particular issue at present with the provision of electricity supplies to depots for charging where the total cost of an upgrade has to be met by the first user, and this needs to be resolved by requiring the supplier to spread such costs among all future users. One trial has been in collaboration with an energy company to ensure that the batteries are reused and the electricity is from solar panels on the depot roof. The Green Industrial Revolution document said nothing about this aspect, which therefore needs to be covered in the forthcoming National Infrastructure Strategy and the Transport Decarbonisation Plan.

Recommendation 9

Energy suppliers should spread the cost of upgrades between immediate and future customers.

Light vans and some smaller lorries can be electric powered, and our recommendations for vans are the same as for private cars. Smaller lorries, in particular those used for local deliveries, can also be battery powered, but their development is not currently as advanced as for cars and vans, and therefore a date for ending their sale should be set later. CILT does not expect long-distance HGVs to be electric powered, either by batteries or by overhead wires, in any significant numbers by 2050.

Recommendation 10

All home deliveries should be undertaken by electric vehicles by 2030.



Passenger rail is already the most electrified mode, but only 38% of the track is electrified, and 95% of rail freight mileage is by diesel. The rail industry has a costed plan to electrify most of the unelectrified track and replace trains to meet a challenge of removing all diesel trains by 2040.¹¹ The remaining non-electrified sections can be served by battery or hydrogen-powered trains, of which there are examples being trialled and in service now. The replacement cycle for both passenger and freight trains can accommodate the replacement of diesels by electric, with much of the current fleet of diesel freight locomotives being due for replacement around 2030. Bi-mode or tri-mode trains are a stopgap and should not be produced after 2035, with modular diesel engines removed as the infrastructure is electrified.

Recommendation 11

Whichever pathway is selected, a rolling programme of rail electrification should be implemented to follow the delivery of schemes in CP6 (2019–24), with priority given to links between container ports and inland distribution centres. New diesel-only trains should not be produced or introduced from now on. Diesel-only trains should be withdrawn by 2040, and bi-mode or tri-mode trains should have their diesel engines removed as the infrastructure is electrified, but in any event by 2050.

Aviation electrification is in the early stages of development, but progress has been rapid. Battery-electric aircraft have flown and some small types are in production, with service planned for the next few years. The industry has plans to introduce small types on short-haul routes by 2030 and is predicting that new aircraft will reduce carbon emissions by about 13MtCO₂ by 2050 (18% of the total reduction required).¹²

Recommendation 12

Government should continue to support industry development of electric aviation with 10 times the amount already announced for the Aviation Technology Institute and Whittle Lab.

An opportunity exists to demonstrate the feasibility and viability of electric aircraft using UK technology and expertise for routes that will contribute to the government’s regional air connectivity agenda.

Electric power is also being developed for shipping, initially for smaller vessels, some with solar generation.

Recommendation 13

Governments should support a trial of electric aircraft on a set of regional routes.

Modal shift

One of the earliest ways of reducing carbon from transport is by making journeys by existing zero or low-carbon instead of high-carbon modes. Examples of this include walking, cycling and public transport instead of car, rail instead of road for freight, and rail instead of air for long-distance trips. However, this will not happen without intervention and care must be taken to avoid adverse consequences. We support the outcome of the Future of Transport Regulatory Review in relation to mobility-as-a-service (MaaS), as this is likely to lead to a shift to trips involving sustainable modes.

We particularly welcome the commitment in the Ten Point Plan to green public transport, cycling and walking. Walking, cycling and using public transport instead of car journeys are the first obvious examples of modal shift, but people’s travel habits occur for good reason, be it convenience, cost, comfort or safety. Making streets safer for walking and cycling may have adverse consequences for deliveries, servicing and emergency access.

Recommendation 14

Local authorities must prepare Active Travel Plans that take account of the needs for servicing delivery, emergency access and disabled people, by 2025.

Recommendation 15

We welcome the commitment to green public transport in the Ten Point Plan and recommend that these measures are implemented without delay.



Sharing roads

Roads, pavements and other rights of way often have to be shared between people walking and cycling, buses, cars, vans and lorries. Walking requires very little space per person, but people walking are vulnerable. People cycling require more space but are also vulnerable to powered vehicles. Buses are highly efficient in space terms, as are delivery and service trucks. Consideration must be given in road design to the needs of emergency and service vehicles, alongside all these other users.

Cycle lanes and facilities in urban areas enable cycling, but there may be conflicts with people walking, particularly if people cycle aggressively and ignore traffic regulations. The design and policing of cycle facilities must ensure that people walking are not put at risk – for example, at bus stops or pedestrian crossings.

Low-traffic neighbourhoods may reduce traffic in one street, but at the expense of another and also with the risk of preventing emergency access.

There is a need to manage the use of the kerbside effectively, balancing the needs of people walking and cycling, bus passengers and freight deliveries.

Street design that is aimed at reducing carbon should also take account of the needs of less mobile people – for example, those in wheelchairs, older citizens, and those who are blind and partially sighted.

Public transport use is currently around 30–60% of 2019 levels, with government advice being to use it only for essential journeys. Once travel restrictions are lifted, this advice should be reversed and travel by public transport instead of by car should be enabled, on the grounds of safety – for example, relevant accident rates – and environmental impact. This should be applied to all types of public transport – that is, buses and metros in urban areas, coaches and rail for longer distance trips. The Ten Point Plan does not include any references to the permanent changes to transport, some of which will result in the return of carbon emissions from cars.

Recommendation 16

As the Covid-19 pandemic recedes, government, local authorities and operators should communicate the safety and environmental benefits of public transport.

Car electrification and modal shift

It could be argued that, if cars are electrified, there is no need for modal shift to other modes. There are of course other environmental impacts from car use, such as congestion, car parking and other emissions. However, there is also a risk that cars will not achieve zero carbon by 2050, or at a rate that keeps carbon within budgets, in particular as cars are responsible for by far the largest share of transport emissions. Autonomous operation adds a further complication by generating more trips. Mode shift is therefore a measure that can achieve early results and mitigate against the risk that zero carbon on the roads will not be achieved.

Air travel is currently around 20% of 2019 levels and will take longer than other modes to recover, although domestic flights may resume quicker than international. With only 1.5% of UK emissions, the scope for carbon reductions from switching from air to rail for UK domestic journeys is limited. Currently rail has more than 50% market share for journeys of less than about three hours – for example, London–Newcastle. HS2 will increase rail's share from 2032. Aviation also has particular advantages for over-water trips – for example, Northern Ireland – and for connections to international flights.

There is significant scope for rail freight to accommodate more journeys currently made by road and despite most rail freight being diesel hauled at present, carbon emissions are much lower. Some 45% of UK HGV tonne-mileage is on trips greater than 120 miles and rail can be viable at such a distance. A further 12% if HGV tonne mileage are accounted for by bulk commodities over 50 miles, for which rail is also viable. As rail decarbonises, the carbon savings are even greater, especially when combined with electric trucks for deliveries.

Recommendation 17

Governments should support modal shift to rail freight with targeted interventions.

There is scope to shift freight from road to water and an evidence review for the Foresight programme suggested adopting best practice to achieve this.¹³

Deliveries and lighter freight loads can use cargo bikes and even walking – for example, Post Office trolleys – especially in urban areas. These require local logistics hubs that are not currently recognised in the planning system as essential city centre activity.

Rural and Urban Differences

High densities, short distances and other features of urban life make active travel and public transport particularly suitable, but the situation is often very different outside towns and cities. There are many different types of rural area, from remote islands to outer suburbs, with different economies, including agriculture and tourism and there are various settlements, including towns and villages.

Currently, 75% of rural trips are made by car, compared with 52% in urban areas. Public transport is limited by the diversity of journeys and active travel by distances and possible lack of facilities (although there are extensive footpaths). Town centres, schools and healthcare facilities often require long-distance journeys. Public services invariably require funding support. We note the conclusions of the Future of Transport Regulatory Review in relation to flexible bus services, and look forward to their future being clearly set out in the forthcoming National Bus Strategy.



Particular solutions are therefore required for decarbonising rural journeys. Electric cars, vans and smaller trucks are ideal for local journeys where range anxiety is not a severe restraint. However, as with broadband, it is important that rural areas get a fair share of charging capability. Public transport may be more limited than in urban areas, but can play particular roles – for example in tourism, or by combining activities (passengers and parcels). Digital connectivity is also important in enabling rural dwellers to work from home and this reduces commuting.

Rural freight will require continued use of road vehicles, but consolidation and efficiency can be improved. Agriculture will require the continued use of diesel vehicles, although some tasks might be performed with electric or gas power.

We note the Call for Evidence on a Rural Strategy for the Future of Transport and will be making a submission based on our extensive work in this area.

Improving transport efficiency

While not having a major effect on carbon, efficiency improvements have a combined effect including on other environmental impacts plus, of course, productivity. For car travel, car sharing is an obvious example and many workplace-based and national or local schemes exist, but with limited uptake, together with informal or family-based arrangements. Some of these can be counterproductive – for example, taking children to school, which may require trips at fixed times – adding to congestion and reducing active travel.

For freight and deliveries, combining loads, ensuring return loads and coordinating deliveries utilises transport capacity better and therefore reduces carbon. Most supply chain providers seek to do this, but it can go against a requirement for just-in-time or next-day deliveries. Pricing may be able encourage combining deliveries, although ‘free’ delivery is often included. Effectively there is a hierarchy of approaches to reduce the impacts of urban freight. These are:

- Minimise the number of road freight trips by changing the mode, consolidating loads and ensuring effective land use planning
- Match the road freight movements to the space available on the road network; considering the time and place the delivery occurs and the route between the origin and destination
- Mitigate the impact of each road trip that remains with lower or zero-emission vehicles that have the necessary safety features, well-trained drivers and quiet delivery equipment

It has long been evidenced that adding more road capacity releases suppressed traffic demand but this can, on balance, be economically beneficial at certain bottlenecks where the relief of congestion outweighs the disbenefits of generated traffic. Benefits may also be seen on reduced traffic through towns and villages. It is important to adopt an integrated approach which considers the interrelationship of demand and supply, as well as ‘locking in’ the overall net benefit through road pricing. Adding rail capacity can similarly be targeted at bottlenecks, such as for freight trains from the east coast ports, or where passenger demand is growing but being constrained by capacity, such as HS2, and transpennine upgrades. HS2 will have multiple benefits of reduced journey times, increased capacity to enable better regional connectivity, and released capacity on the classic lines to enable more regional and local journeys and freight. Adding more capacity at airports will also have the effect of reducing delays and again the benefits and impacts must be weighed. Delays in the air can also be reduced by rearranging airspace, making use of technological improvements such as precision-based navigation.



The speed of transport has an effect on carbon use, because of the basic physics of using energy to overcome resistance, be it across land, sea or air. Slow steaming is a measure used in the maritime sector where it has a clear impact on carbon emissions, but it has adverse effects elsewhere – for example, on the number of vessels (or truck, trains or aircraft) needed, or on insurance or other costs. It is therefore a short-term measure that can be introduced in emergency circumstances, but not a long-term solution. In aviation, improved airspace management can reduce flight lengths and enable optimum flight profiles. ‘Slow flying’, involving a series of short hops with electric aircraft instead of a direct long-haul flight, is a retrograde step and unlikely to attract many passengers.

Dynamic pricing is perhaps best known as being a pricing strategy of low-cost airlines, where the price paid depends on demand. Of course, there have been many examples of pricing according to time, for example peak and off-peak tickets on public transport and variable coach fares. However, with air transport, where standing is not permitted, it is nevertheless amazing that load factors of 90% are achieved. Such high levels of efficiency are unachievable on other modes for a range of reasons, but dynamic pricing could have a greater role in some longer distance passenger and freight journeys. Dynamic pricing could also be applied to road pricing which we see as the appropriate way to make better use of road capacity, reduce carbon and provide funding for transport improvements.

Reducing travel

Thanks in part to the abilities of transport professionals, the cost of transport has reduced dramatically over many years. Historically, canals, railways, aircraft and road vehicles have enabled travel at very low cost. Examples could include the low cost of shipping low-value goods around the world, and low-cost airlines. However, these costs do not necessarily include the external costs, such as of carbon as is being considered in this paper, and therefore there may be ‘too much’ travel. This concept can become difficult to argue, because it then requires considerations of social equity or fairness. Four issues are covered below: local sourcing, rationing, price and congestion.

Local sourcing – for example, in terms of food miles – is sometimes put forward as a way of reducing carbon. Local sourcing of food – for example, from a farmers’ market – will probably achieve this but once a product requires anything more than a local journey and an element of double handling, the distance is largely irrelevant. Measures to attempt to reduce the sale of New Zealand apples in the UK or electronics from China are therefore not appropriate. However, ‘excess’ transport can be seen in fast fashion and next-day delivery, but these can be countered by reuse and recycling in fashion and by combining deliveries.

Could transport be rationed? Wartime situations and even the current Covid-19 pandemic have seen some forms of rationing, but individual schemes such as personal carbon budgets are inevitably unsatisfactory in not meeting demand and subject to abuse.

Rationing by price is certainly possible and to an extent already exists by taxes on transport fuel or decisions to part fund public transport. However, if price is used heavily it will almost certainly have a greater impact on the poorer sections of society. Road pricing should be designed to be cost beneficial and justified in terms of time savings. It should be a part of a local strategy to improve alternatives for car users and can produce substantial reductions in cost compared with fuel duty for off-peak and rural journeys. Where poorer car users have no alternative to car use in the peak means must be found to provide offsetting compensations or exemptions, though these should be kept to a minimum.

Travel could also be constrained by simply not providing for growth, and allowing congestion, overcrowding, limited resilience or the unavailability of tickets. Governments would find such a policy very unpopular, it would be environmentally damaging, and CILT would certainly not advocate it. Any decision to create new transport capacity should take full account of the pathway towards decarbonisation before applying a policy of restriction.

Offsetting

If all the measures described above are not successful in keeping within the carbon budgets and achieving zero by 2050, can net zero be achieved through offsetting? While some sectors of transport probably can achieve close to zero, others will not. Aviation, for example, expects to have to offset about 36% of its expected emissions in 2050.

Offsetting has been in existence for some time, mainly through the EU Emissions Trading System that was set up in 2005, with aviation included from 2012. In addition, some airlines enable passengers to offset their emissions voluntarily. Various offsetting mechanisms are used, including buying carbon credits from organisations that have achieved better results than their allowances, investing in projects such as tree planting, and direct carbon removal. We welcome the commitment to carbon capture, usage and storage in the Ten Point Plan for a Green Industrial Revolution. For the aviation industry, agreement has been reached at ICAO on CORSIA. Offsetting will also be required for shipping as the current IMO target is only a 50% reduction by 2050.

One of the key aspects of offsetting schemes is to ensure that they are credible and verifiable, and additional to activity that would take place in any event. It is understood that this was to be a major agenda item at the COP26 meeting in Glasgow in November 2021, but is not noted as one of the five priority areas in the Ten Point Plan published in November 2020. We suggest that this should be fully explored before adopting a policy of ignoring international offsets, as advocated by the CCC.

Recommendation 18

The UK government should use its position as the host of COP26 to ensure that agreement is reached on how to verify international offsetting schemes.

Transport has elements of social inequity but it is also a leveller – everyone has access to road space and public transport.

Offsetting: getting away with a profligate lifestyle?

The definition of sustainability includes economic growth, environmental protection, and social equity. It does not propose levelling down, or even averaging out, activity. Transport has elements of social inequity – people who cannot afford private transport or long-haul flights – but it is also a leveller – everyone has access to road space and public transport. CILT members have long been involved in making transport more available and cheaper for people and goods, whether in terms of visiting friends and relatives overseas, or making a wider range of goods available.

Offsetting is a way of attacking the enemy – carbon – if there is no other way, provided that its measures are verifiable as additional. If offsetting was only available to individuals, it could be seen like the medieval practice of ‘indulgences’. CILT’s view is that offsetting should be for sectors as a whole and not related to individual activity.



TAXATION

Taxation is a major element of transport costs and can be used to affect the amount and timing of travel, and carbon emissions.

CILT has been a longstanding supporter of road pricing as the way to use road capacity better, by sending signals to motorists and hauliers that encourage the use of capacity when it is available. It would replace the income lost when fuel duty and VAT on fuel declines as the electric vehicle fleet grows and in due course would completely replace fuel taxes, road fund licences and congestion charges. While petrol and diesel cars remain in the fleet, it can also be designed to encourage a switch to electric, and to encourage less-polluting vehicles (in terms of local air quality). We especially welcome the recognition of the need for the tax system to change in the Green Industrial Revolution document and will press for this to become a commitment.

Recommendation 19

The government should announce that, over time, tax on fuel and vehicle use will be replaced by road pricing. It should be designed to ensure that electric and other vehicles pay their fair share of costs.

Some parties have called for increased taxes on aviation as a means of reducing carbon emissions. Tax on fuel used for international flights is prohibited unless there is bilateral agreement. A frequent flyer tax would also be very difficult to implement given the largely international nature of air transport. The UK currently charges one of the highest levels of departure tax in the world, which has a particular adverse effect on regional connectivity, as it is payable on both legs of a domestic flight.

Taxing the emissions from shipping is likely to be very challenging because of its international nature.

Recommendation 20

The government should amend Air Passenger Duty on flights between the four home nations to reduce the adverse effect on regional air connectivity.

CARBON PRICING

A carbon price is already included in transport appraisals, but there remain arguments about the level.

The current carbon trading price, even before the Covid-19 pandemic, is low because the credits are plentiful. The carbon price is also an element in offsetting and the current low level means that offsetting is currently cheap. The argument is about

the future price, which is difficult to predict. The government has indicated that carbon values for appraisal are to change and, until the change is promulgated, the high values used for sensitivity testing should be used.¹⁴



CONSENSUS AND ACCEPTABILITY

CILT is completely aware that whatever measures may be best in terms of keeping transport carbon within budgets and achieving net zero by 2050, only those that are widely acceptable have a chance of being implemented.

Opinion polls, attitude surveys and events such as those arranged by the Climate Assembly UK show public attitudes, and lobbying and campaigning by particular groups can also show levels of support or, more likely, opposition. Although transport is not often the most important issue at election time, it certainly plays a part.

A move to electric cars seems to now be accepted by most motorists, and car manufacturers are rapidly turning their production towards electric. The price of electric vehicles remains high and this will have impacts on poorer people who rely on cars, at least until there is a significant second-hand market. Government subsidy (currently in terms of plug-in car grant) should continue until there is no difference between electric and petrol/diesel cars. A cut-off date of 2030 for the sale of new pure petrol and diesel cars of 2030 also appears to be acceptable to the wider public.

Road pricing is likely to be more challenging, given the history of previous attempts at city centre charging. However, the government would be wise to undertake a range of attitude and opinion exercises. There is general agreement that ‘the polluter should pay’, but fairness across all sectors, including freight, and the benefit of being able to choose to pay less at quieter times of day or in rural areas, or to reduce costs by car sharing, should be key objectives.

A shift towards active travel and public transport is generally seen as positive in urban areas, but less so in rural areas. Low-traffic neighbourhoods have been controversial, probably because of the speed of implementation. Bus and rail fares have always been controversial, and the implementation of the Williams’ Review’s and others’ recommendations will enable a radical restructuring of rail fares, associated with changes such as smart ticketing and flexible season tickets.

Attitudes to air travel appear mixed. On the one hand, many accept that air travel is a significant source of carbon emissions per journey, but those same people value air travel highly – for example, for holidays or to visit friends and relatives. Some business communications can be undertaken without air travel, but there will always be a need for face-to-face contact and travelling to or from work, or for education, is considered appropriate. (Indeed, during lockdown it is one of the few exempt situations.)

Recommendation 21

Government, with the support of transport organisations, including CILT, should engage with the wider public to monitor attitudes and undertake long-term campaigns to persuade people of the benefits of various changes, such as road pricing, electrification, active and public transport, as appropriate to particular geographies, social and age groups.



CILT'S EXPERTISE, SKILLS AND ACTIVITY

CILT's membership consists of professional individuals and organisations who understand what works and what customers value, and we can therefore assist policy-makers in making decisions.

During 2021, CILT will be holding events, responding to consultations, submitting evidence and updating its studies. CILT members are encouraged to engage with colleagues, acquaintances, politicians, campaign

groups and local organisations, spreading the message that transport can achieve net zero carbon emissions by 2050 and keep within carbon budgets by a combination of measures as set out in this paper.



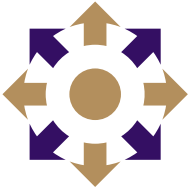
CONCLUSIONS

This year-end report summarises work by various CILT groups on the issue of decarbonising transport. These groups have considered a range of government statements and studies, industry and academic contributions and come to conclusions based on their expertise and knowledge. A series of measures to decarbonise transport are considered and recommendations made where a policy needs to be established, confirmed or supported.



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