

DÁIL ÉIREANN

AN COMHCHOISTE UM GHNÍOMHÚ AR SON NA HAERÁIDE

JOINT COMMITTEE ON CLIMATE ACTION

Dé Máirt, 23 Márta 2021

Tuesday, 23 March 2021

Tháinig an Comhchoiste le chéile ag 12.30 p.m.

The Joint Committee met at 12.30 p.m.

Comhaltaí a bhí i láthair / Members present:

Teachtaí Dála / Deputies	Seanadóirí / Senators
Richard Bruton,	Lynn Boylan,
Réada Cronin,	Timmy Dooley,
Cormac Devlin,	Alice-Mary Higgins,
Alan Farrell,	John McGahon,
Darren O'Rourke,	Pauline O'Reilly.
Christopher O'Sullivan,	
Bríd Smith,	
Jennifer Whitmore.	

Teachta / Deputy Brian Leddin sa Chathaoir / in the Chair.

Decarbonising Transport: Discussion (Resumed)

Chairman: On behalf of the committee, I welcome Dr. Elisabeth Windisch of the International Transport Forum at the OECD; Professor Alan McKinnon, Kühne Logistics University, Hamburg, Germany; and Dr. Lynn Sloman of the Transport for Quality of Life consultancy. Thank you for appearing before the committee to share your expertise.

With regard to privilege, I remind you of the long-standing parliamentary practice that you should not criticise or make charges against any person or entity by name or in such a way as to make him, her or it identifiable or otherwise engage in speech that might be regarded as damaging to the good name of the person or entity. Therefore, if your statements are potentially defamatory to an identifiable person or entity, you will be directed to discontinue your remarks. It is imperative that you comply with any such direction. There are some limitations to parliamentary privilege for witnesses attending remotely outside the Leinster House campus and, as such, you may not benefit from the same level of immunity from legal proceedings as a witness who is physically present does.

Members are reminded of the long-standing parliamentary practice to the effect that they should not comment on, criticise or make charges against a person outside the Houses or an official either by name or in such a way as to make him or her identifiable. I also remind members that they are only allowed to participate in this meeting if they are physically located on the Leinster House complex. In this regard, I ask all members, prior to making their contribution to the meeting, to confirm that they are on the grounds of the Leinster House campus.

For people who are watching this meeting online, Members of the Oireachtas and witnesses are accessing the meeting remotely. Some members are present with me in the committee room and others are joining virtually. Indeed, the witnesses are joining from overseas. Due to the unprecedented circumstances and the large number of people attending the meeting remotely, I ask everybody to bear with us should any technical issues arise.

I invite Dr. Windisch to make her opening statement.

Dr. Elisabeth Windisch: I am a transport planner and transport economist by education. In the past ten years, I have worked on assessing the impact of transport on the environment and on developing policy measures that help increase transport's sustainability. The International Transport Forum, ITF, at the OECD is a global transport policy think-tank with over 62 member countries. The ITF's decarbonising transport initiative aims to help policymakers make the right decisions to meet their climate ambitions, based on quantitative evidence. We are very grateful for our co-operation with our member country Ireland, which has held the ITF's presidency for the past two years. Collaborating with representatives from Ireland has allowed us to produce innovative and insightful work for the greater Dublin area and beyond. In what follows, I rely on much of this work to ensure my intervention is as Ireland-specific as possible for a representative from an intergovernmental organisation. I am focusing on passenger transport, as I believe one of today's other witnesses will perfectly cover considerations regarding freight transport.

The committee's aim to take action in line with the "avoid-shift-improve" framework is laudable. Following this framework allows for the development of a sustainable transport system that is equitable, accessible and safe, and which drives economic productivity and has limited environmental impacts. Deep emissions cuts will require true transformations. They

will require embracing innovations and potential disruptions, and they will likely require taking risks and taking decisions under uncertainty. To mitigate any risks and reduce uncertainty, evidence-based, holistic and long-term planning, based on quantitative evidence, best practice and scenario analysis, is required. It is essential to start now to look beyond 2030 and even beyond 2050 to avoid missing relevant actions today that will have essential impacts in the future.

Measures in the avoid category will help decouple economic growth from increases in transport demand. Land use measures that encourage compact developments and the redevelopment of local centres in line with the concept of the 15-minute city are essential to reduce travel distances and to encourage shifts to more sustainable modes. The pandemic will also provide the opportunity to encourage teleworking. However, teleworking practices under non-pandemic circumstances are likely to have rebound effects. People will increase their travel activity during their leisure time.

This is where the importance of shift measures becomes even more apparent. Individual motorised mobility needs to shift to active modes or to shared and efficient motorised modes, where required. These may be the classic public transport modes. However, transport innovations can and should play a significant role as well. ITF research for the greater Dublin area has shown that if 20% of private car trips were replaced with shared mobility on-demand modes, emissions would fall by more than 20%. These reductions do not assume that shared vehicles may be electric, which by now would be a feasible option as well. A transport system based on such shared mobility can decarbonise transport while promoting a truly sustainable transport system, including the use of existing bus and rail networks. Another ITF study shows that if 20% of car users were to shift to shared services, mobility demand would require 40% less street space. This space could be used for active modes or green spaces, greatly enhancing the liveability of the city. The deployment and uptake of such innovations need to be encouraged by sufficient financial and regulatory supports. Measures can include congestion charging, low emission zones, dynamic parking pricing, the phase-out of subsidised parking and so forth. When implementing such measures, it must first be ensured that adequate travel alternatives exist.

Improve measures comprise instruments that improve the use of fuels, the efficiency of vehicles and the performance of related infrastructure. In Europe and elsewhere, electricity has been gaining ground as the alternative energy carrier to fossil fuels in transport. In addition, smaller, lighter vehicles, electric or not, will always outperform their heavier, larger counterparts. People should be encouraged to use the right size of vehicle at all times. This brings us back to the concept of vehicle sharing. In this case, it is about ensuring that vehicle rental systems allow for renting a vehicle of the right size, be it for an urban trip or a holiday trip for several weeks.

Reaping benefits from avoid-and-shift measures will take time. This has two main implications for policymakers. First, they need to move fast on these measures to get them under way. Second, relying on the uptake of electric vehicles will be unavoidable if Ireland is to achieve 2030 targets. However, it is advisable to do this smartly. This means it is necessary to: encourage the uptake of full electric vehicles and avoid long transition periods via hybrid alternatives; ensure that additional electricity demands are fully covered by renewable energy sources; deploy electric vehicles where they are most useful and where more sustainable alternatives do not exist - for example, in public fleets and in non-urban areas; speed up the uptake of electric vehicles, in line with the conditions just mentioned, via well-targeted fiscal measures and the provision of infrastructure; and, finally, consider the fuel tax shortfall that countries with high

electric vehicle uptake would face and prepare for it accordingly.

I will say a word about the people. Mobility choices are individual choices. The challenge that lies ahead will require behavioural changes by each of us. It will require people to reassess and change their habits, and maybe even their way of life. Some may even be required to accept higher expenditure - in time or money - on their mobility needs, at least in the short run. Such changes will not be easy. Nobody should therefore diminish the importance of bringing people from all walks of life on board, including the effort this will take. It will require communicating the importance and, yes, the urgency of climate action, as well as the relevance of individual behaviour. It will also require communicating that meeting climate ambitions is achievable and that a successful transition has the potential to result in societal benefits far beyond carbon dioxide emissions reductions alone.

The pandemic provides an opportunity to build back better and for each individual to go from exceptions to new, sustainable routines. Let us not miss this opportunity.

Chairman: I thank Dr. Windisch for her very detailed and interesting opening statement. I now turn to Professor McKinnon for his opening statement.

Professor Alan McKinnon: I thank the committee for inviting me to participate in this event. I am a freight specialist and my comments will relate to freight and logistics. There is general agreement that freight transport will be a difficult sector to abate in carbon terms, partly because of its heavy dependence on fossil fuel but also because of the forecast growth rates for freight traffic. On that point, however, Ireland is to some extent an exception because its freight traffic growth has been relatively slow. Ireland has still not got back to the level of freight activity it had in 2007. Indeed, the trend in Ireland's freight traffic growth has decoupled from the growth of its economy, which many countries are aspiring to achieve. Nonetheless, one should not be complacent because it will still be a challenge for Ireland to meet its carbon targets for 2030 as they relate to the freight sector.

I note that the committee uses the avoid-shift-improve, ASI, framework in its work. In my work on freight transport, I like to divide the improve category in three, looking at asset utilisation, energy efficiency and switching to lower-carbon energy sources. I would like to examine the five sets of measures. On the avoid option, we can try to restrain the growth of freight traffic. This takes us a bit beyond the transport realm into sustainable consumption, which includes the circular economy, minimising waste and so forth, just to reduce the amount of stuff we have to transport. We can digitise more physical goods. We could also reverse some of the logistics trends that have driven freight traffic growth over the past few decades, moving back to more decentralised logistics or sourcing more products locally. These measures, it seems, have a fairly high carbon mitigation cost.

The second aspect is modal shift. I believe I am correct in saying that Ireland has the most road-dependent economy in Europe in terms of freight. The railways account for about 0.5% of its total freight transport. If it were to make a shift with freight, it would be starting from a very low base. Perhaps, however, we should broaden the definition of modal shift. In an urban area, for example, we can think about getting freight out of vans into cargo cycles, thus moving to non-motorised modes of freight transport that would help. We could consider more coastal shipping of freight.

The third set of initiatives relates to asset utilisation. I have looked at the figures, which show that Ireland's percentage of trucks running empty is significantly above the EU average.

There is potential for filling vehicles more effectively. Current developments in digitalisation in this regard will help, including the use of online platforms to help companies to find backloads for their vehicles. It would also help if we could encourage companies to share their logistics assets through the process of supply-chain collaboration. Maybe even more radical measures, such as relaxing the just-in-time principle, could be considered. This principle gets blamed for much of the under-loading of vehicles.

The fourth category of measures includes improving energy efficiency. Ireland, like all EU countries, will benefit from the imposition of fuel economy standards for trucks, which will see the carbon intensity of new trucks reducing by 15% by 2025 and 30% by 2030. That, however, is a longer-term development. There are things we can do in the meantime to improve the energy efficiency of trucking, such as training drivers to drive their vehicles more fuel-efficiently. I am aware that this was the subject of a recent Irish Government study.

My final category of initiatives involves shifting to lower-carbon forms of energy in the freight sector. My preference in this regard is for electrifying as much as possible and then taking advantage of the decarbonisation of electricity. Ireland's electricity had relatively high carbon intensity but the rate has been dropping quite steeply in recent years. Electrification will be very easily done in urban areas for local deliveries. The decarbonisation of vans by using electricity is already well under way. It is going to be a tougher challenge for long-haul road freight. There is a debate at the moment as to whether this should be achieved by batteries, hydrogen or electrifying the highways. It seems that for a country the size of Ireland, where the average length of haul for freight is only 60 km or 70 km, the best approach would be to use batteries to decarbonise. The good news is that we can use a range of technologies to decarbonise freight. If they are applied in combination in a time-phased way, it will help Ireland to meet its carbon-reduction targets by 2030.

Chairman: I thank Professor McKinnon for that. I now invite Dr. Sloman to make her opening statement.

Dr. Lynn Sloman: I thank the committee for the chance to contribute to the discussion. I am director of a specialist consultancy, Transport for Quality of Life, based in the UK. I am vice-chair of a steering group appointed by the Welsh Government to oversee the delivery of public transport and active travel schemes in south-east Wales, set up after the Welsh Government cancelled the construction of a motorway around Newport, south Wales. I am also a board member of Transport for London but I am speaking today in a personal capacity.

I would like to make five points. First, the aim to reduce carbon emissions by 51% by 2030 is very challenging. Vehicle electrification will certainly make the largest contribution to that reduction but will not be enough on its own. With a ban on the sale of new petrol and diesel cars from 2030, the majority of cars on the road will probably still be powered by fossil fuels into the early 2030s. That is because the average car is used for 14 years before it is scrapped.

Second, given what I have said about fossil fuels, in addition to using technological solutions, we will need to change travel behaviours, as Dr. Windisch has said. The UK Climate Change Committee has recently recommended reducing demand, or care mileage, by 6% by 2030, through modal shift and measures that reduce the need to travel, such as remote working. I view 6% as a minimum – not least because there are significant risks of underachieving the necessary carbon savings if the take-up of electric cars is slower than forecast.

We have recently done some work for the Welsh Government to develop sustainable trans-

port mode share targets. The Welsh Government published its transport strategy last week, including for the first time a target to increase sustainable transport mode share from 32% to 45% by 2040. Wales also has a target to have 30% of the workforce work remotely on a regular basis. Scotland has set a target to reduce *per capita* car mileage by 20%. It is that kind of strategy and those kinds of targets that are necessary.

Third, we need to pull all policy levers in the same direction. It is no good investing in cycleways and public transport while at the same time building more roads. We recently undertook an independent assessment of the English Department for Transport's £27 billion road investment strategy, RIS2. We found that RIS2 was likely to increase cumulative CO2 emissions by about 20 megatonnes between now and 2032. That is about 5% of emissions from the strategic road network over the relevant time period. About one-third of the additional emissions are from construction, one-third from increases from high speeds and one-third from induced traffic. The UK Climate Change Committee has argued that the UK should prioritise broadband investment over road network expansion.

Fourth, if we are to achieve significant mode shift, very substantial investment - both capital and ongoing revenue - is required. That implies a transfer of resources away from road construction. We need to design cycle networks as good as those in the Netherlands and Denmark. The growth in popularity of e-bikes means that longer cycle trips become more feasible and so cycle superhighways radiating out from towns for 15 km or more should be part of a decarbonisation strategy. We need comprehensive integrated rail and bus networks as good as those in Switzerland and Germany, running from early in the morning until late at night, seven days a week. We need to recognise a universal basic right for everyone to be able to have a decent life without having to own or drive a car.

My final point is that road user charging, what I call a pay-per-mile "eco levy" on driving, should be part of the package to shift travel behaviours and income from it should be ring-fenced to provide an ongoing revenue stream for sustainable transport. Road user charging is seen as politically difficult but the evidence from Stockholm, Milan, London and elsewhere is that it creates more winners than losers and particularly benefits older people, young people, those on a low income and women. Places that have implemented a road user charge find that once people see how it improves their town or city, there is net support. We need to explore imaginative options. For example, some of the money from an eco levy could be used to fund free local public transport. A number of towns in France have made local bus services free with very positive results. I am very pleased because I live in Wales that the new Wales transport strategy includes a promise to deliver a strategy for fair road user charging over the next five years.

In summary, we need both technological and behavioural change. It is necessary to reduce car mileage and that implies a sustainable travel mode share target, a traffic reduction target or both. Modal shift will be undermined by large-scale road construction. We should look at creative options like a pay-per-mile eco levy on driving to generate a funding stream for benefits like free local bus services. We need to take the best from other countries and apply all of it in order to respond to the challenge we face.

Chairman: This meeting is confined to a maximum of two hours. I propose that each member be given two minutes to address his or her questions to the witnesses to ensure that all members get an opportunity to put their questions. Is that agreed? Agreed.

While the clerk is noting the order in which members raised their hands, I might direct my

questions to our witnesses. I will start with Dr. Sloman. I was very interested to hear at the weekend that a new road linking the N4 motorway to Cardiff Airport is no longer being funded. As I understand it, this is part of the new Welsh transport strategy. I am interested in hearing more about this, although not specifically about that project. There appears to be a major policy shift in Wales and the UK generally away from road building. It is interesting that this is the approach taken. What is also very interesting is that there seems to be cross-party support in the UK for this approach. Dr. Sloman said that the UK Climate Change Committee has recommended that journey demand be reduced by 6%. I would like to hear more about that, and the principle of reducing demand for journeys and not continuing with road projects that have been planned, perhaps for some time. I am also interested in the Scottish approach to achieving a *per capita* mileage reduction of, I believe, 20%.

In response to Professor McKinnon, I think we all know that rail freight is suited to long distances. Are there payloads that are particularly suited to distances of less than 300 km, as we would have in Ireland? I am also very interested in the point about sharing truck capacity and that a lot of emissions arise from empty trucks driving around. How far gone are we in realising some of the big changes in logistics about which Professor McKinnon spoke?

I was very interested in Dr. Windisch's point about smaller vehicles, e-bikes and cargo bikes. She indicated that these are particularly suited to town and city centres. Could she elaborate on how we might incentivise smaller vehicles versus larger vehicles, why we should do so and if there is international experience in that area? I am very interested in the potential of e-bikes because a cycleable journey now is no longer 2 or 3 km; it is probably up to 15 km. I am very interested in hearing more about that. I ask Dr. Sloman to respond first.

Dr. Lynn Sloman: Obviously, I am speaking as an independent consultant and not on behalf of the Welsh Government. My sense is that there is a wide recognition in Wales that one cannot ride two horses at the same time. We cannot build roads and create increased traffic and car dependence and also hope to achieve modal shift. This is not a universal view politically but there is a growing sense of support from all political parties. I do not think that is necessarily true in other parts of the UK. I certainly do not think it is true in England so different pictures are emerging from different parts of the UK.

The other factor in all of this is that building roads is expensive. If we need to find more money to invest in world-class public transport networks and cycle facilities, it makes sense to reduce the road budget to free up money for that. One of my colleagues has done a piece of work that was published today looking at the potential for investment in rural bus services in England. It is very clear that reallocation of the funding that is currently being spent on road building would enable something akin to Swiss-style public transport service frequency standards, with every village having a service every hour throughout the day. It feels as if these are the sorts of ambitions we need and they are really only possible if we stop spending so much money on road building.

On the point about modal share targets and traffic reduction targets, in the analysis we did for the Welsh Government, we realised that reducing traffic mileage to the extent implied by the Scottish target - a 20% reduction in *per capita* mileage - is very challenging and requires investment in high-quality alternatives and definitely some form of demand management, whether that is road user charging or other restrictions on car use. The conclusion is inescapable. We need to look at demand management as well as improvements over the next few years.

Professor Alan McKinnon: The Chairman's first question related to rail freight and in-

creasing rail's share of the freight market in Ireland. He is right. The average length of haul is very low on the road network. It is difficult for the railways to compete where the length of haul is short but one must also factor in other variables. It also depends partly on the quantity of freight being moved. Here in the UK, there are examples of perfectly viable rail connections over distances of 40 or 50 miles. Backloading can also improve the commercial viability of the service. Another factor that must be taken into account is the proportion of factories and warehouses in Ireland that have a rail connection. I suspect relatively few do. In that case, one is dependent on an intermodal operation which includes a road feeder movement at one or both ends of the transit. Where the length of the rail haul is very short, long road feeder movements make it very difficult to provide the service competitively.

If one looks at the EU's smart and sustainable mobility strategy, published in December, one will see that the strategy's main emphasis is on freight modal shift. There is a move under way in the EU and globally to get more freight onto rail. Ireland should attempt to do that insofar as possible. It would, however, be starting from a very low base. The contribution the freight modal split will make to Ireland's decarbonisation by 2030 will probably be quite limited.

The Chairman's second point related to empty running. I do not know why Ireland has a higher level of empty running by trucks than other EU member states. To some extent, it may be due to geographical imbalances in the traffic flow. It could also be to do with the length of haul. If the average length of haul is very short, companies do not have a great incentive to find a backload. If the average length of haul in Ireland was 500 km, companies would put a lot of time and effort into finding return loads. The one positive thing I can say in this regard is that digitalisation is changing the freight market. This is creating the opportunity for companies to find matching loads in both directions electronically. More and more companies are participating in that. We recently carried out a survey of more than 90 senior executives in logistics across Europe and the one trend on which they were all agreed was that digitalisation is going to transform logistics over the next five to ten years. That will be reflected in a reduction in the empty running of trucks everywhere, including in Ireland.

Dr. Elisabeth Windisch: I will just repeat the question. The Chairman touched on the topic of small vehicles, how their use could be encouraged and what the issues were more generally in that regard. More specifically, he expressed an interest in e-bikes. There are two issues with the use of smaller vehicles. The first is that people tend to buy one, two or maybe three personal mobility means. One of these is often a private car, which serves all needs. To think about holiday trips in summer, people may want to take a lot of baggage and their children. Families therefore obviously need to buy big cars, but they also use this car to go to work and for all kinds of other trips where more efficient mobility means would be better and more efficient to use. To encourage the right use of the vehicle, we would have to move away from the model of owning one's own car and making use of it all the time. As I said in my statement, policy would be required to encourage a shift towards an ecosystem of shared use of vehicles, which would encourage people to use the right size of vehicles at all times rather than always falling back on this one-size-fits-all option, which for many people actually only perfectly fits for the purposes of holidays.

There is a second issue with regard to the topic of size of vehicles. The Chairman will have noticed that, over the past 30 or 40 years, the size of passenger cars has significantly increased while the number of people the vehicle can carry has not. In the mid-1970s, an average passenger car weighed approximately 1 tonne while the average passenger car in the European Union today weighs approximately 1.5 tonnes. This results in these vehicles being much less efficient

and using much more petrol, thereby creating more emissions. An argument often made in this context is that these weight increases were necessary to achieve benefits in safety and convenience, through sound systems and whatnot. However, this argument is not really valid if we think about it. While there are improved safety systems, the very fact that the cars are heavier creates a system that is much less safe for everyone else. If we were to drive this argument forward, very soon everybody would be driving around the city in a tank, which is obviously not an efficient way of getting around.

Pressing this issue on is a bit more tricky because tackling it is not really in the remit of Irish authorities. Rather, it is something that must happen at EU level. We are all aware of super emissions standards for cars, trucks and vehicles in general. There is an inherent problem in these standards in that, while they aim to reduce CO2 emissions on a per kilometre basis, they are dependent on the weight of the vehicles themselves. There is, therefore, no real incentive for manufacturers to reduce the weight of the vehicles, making them more efficient overall. In this respect, I can point the Chairman to several studies the International Transport Forum, ITF, has carried out with specific regard to heavier vehicles. This is an essential issue. It is also an issue with regard to the uptake of electric vehicles because such vehicles are also much more efficient when they are smaller and lighter.

With regard to electric bikes and how they could be encouraged in urban and even non-urban environments, there is a growing trend globally and internationally. E-bikes have been introduced to shared vehicle fleets and this has also encouraged many private persons to take them up. They can see the benefits and that they can cover longer distances. This is a very positive trend because the use of such bikes replaces many commuter trips. Such journeys are definitely more efficient than trips in private cars. E-bikes are obviously not perfect, unlike proper active mobility, such as walking or biking without electrical assistance. They also require additional infrastructure. This is not to say that e-bikes should not be encouraged; quite the opposite. They should be encouraged because the benefits will certainly outweigh everything else.

With the introduction of innovative shared services and mobility means, policymakers must make sure that the right people are attracted. We do not want to attract people who would otherwise use mass public transport as this would likely result in increased emissions. This will depend on a very local context, on the city and on whether the public mass transit system is fuelled by electricity or fossil fuels. Specific comparisons must be made to ascertain whether it would be beneficial but generally measures to encourage-----

Chairman: I will have to stop Dr. Windisch there because our time is limited. I apologise to members of the committee. I probably asked far too many questions but I will now have to push the meeting along. The next contributor is Senator McGahon.

Senator John McGahon: I thank Dr. Windisch for her comments. I have found this discussion very interesting because my interest in the climate action and climate side of things is in sustainable transport. My first question is for Dr. Sloman and relates to cycle superhighways. I have experience of them, having used one in London a number of years ago when I cycled from Barking to the city centre. Having done a bit of research on the subject, it is clear that for distances that are longer than a certain number of kilometres, 20% of commuter journeys are made by bicycle. There is potential in making super cycleways as friendly and enjoyable as possible so that people start using them. That said, while they work in London and other large cities, how do we create sustainable super cycleways in large provincial towns like the one I come from, which has approximately 40,000 people? Do we use them to link large provincial towns to one another? How would they work in settings outside of a massive capital city like London?

My second question is also for Dr. Sloman and relates to her fourth point about the eco levy in London. I get its concept and that the money raised from the levy is ring-fenced for good projects that can benefit people, for example, a warmer homes scheme. Who has the decision on how that money is spent? Does it go to the British Government, which then allocates it as it sees fit, or is it ring-fenced to what would be described in Ireland as a local authority? Does the mayor of London decide how it is spent or does Downing Street allocate it throughout the country?

My final question is for Dr. Windisch. What has been the major barrier to the uptake of electric vehicles?

Dr. Lynn Sloman: I thank the Senator for his questions, the first of which was on cycle superhighways like those in London and whether there was an applicable equivalent in more rural areas. There is. Countries like the Netherlands, Germany and Denmark are building cycle superhighways that extend for up to 40 km from their main cities. The capital region of Denmark - Copenhagen and its surrounding municipalities - have a fantastic network. Denmark is planning to build 760 km of high-quality cycleway radiating out great distances from the centre of Copenhagen. People are making journeys of 12 km or 13 km on average on some of Copenhagen's routes and many are using e-bicycles. In continental Europe, e-bicycles are becoming a mainstream mode of mobility. The Netherlands is set to reach the point, if it has not already done so, where more than half of new bicycle sales are of e-bicycles. The kind of cycleway that the Senator experienced in London is applicable to areas outside large metropolitan centres, and when combined with e-bicycles, they make perfect sense.

The Senator's second question was about road user charging and who got to keep, spend or decide on the spending of that ring-fenced income. London's congestion charge dates back to 2003 and its money goes to Transport for London. The local authority - in this case, the regional transport authority, which is Transport for London - makes the decision about how that money is spent. There is a live debate under way about what will happen as people stop paying fuel duties because they will be driving electric cars. In the UK, there are rumblings about the Treasury considering replacing the fuel duty with some sort of road user charge. If it was a national scheme, who would get to keep that money is unclear. That is still to play for. My opinion is that there is a great deal of sense in the money being retained locally, not necessarily at town level, but certainly at sub-regional level because that is the level at which decisions can be made about how to put in place the best possible alternatives. If one had that kind of system, it would be important if there were rules at national level about how that money could be spent so that it was spent in a way that supported sustainable transport. This could be interpreted widely. In Wales, there has been a discussion about whether the money from a road user charge might be spent on keeping rural village schools open, thereby reducing the requirement for people to drive their kids long distances. That is the level at which the discussion should take place.

Dr. Elisabeth Windisch: There are a few barriers to the uptake of electric vehicles, but many of those will be overcome and resolved in the next few years. One barrier has been the number of available models, which is probably insufficient for a diversified consumer market. In light of announcements made by large manufacturers in the past few months and years, though, I believe that barrier will be overcome soon.

Cost is another issue, but it will be a matter of only a few years before there is cost parity between electric vehicles and their conventional counterparts. In this regard also, I would not be too worried. It might only be for the first few years when we really want to give a push - Ireland should - that additional financial incentives should be provided for vehicle users, albeit

within the constraints that I mentioned in my opening statement. For example, such incentives should be used for non-urban areas, public fleets and so on first.

Another important barrier is the vehicles' range autonomy but there will also be important progress in this regard over the next few years thanks to battery technologies advancing rapidly. However, we can probably not assume that there will be parity of autonomy between electric vehicles and conventional vehicles very soon. This barrier will be resolved through the provision of public recharging infrastructure. From a policy perspective, though, I would not overdo it. As soon as people have experience of owning electric vehicles and how to use them, they will realise that range is much less of an issue than they originally thought and the normal range of an electric vehicle will always be sufficient as long as they can charge at home and perhaps at the workplace. As such, infrastructural development should focus mainly on the highway network to cover distances that will be beyond the range of standard electric vehicles.

Senator Timmy Dooley: I thank the witnesses for their presentations. Dr. Windisch has answered most of my questions, particularly as regards electric vehicles. I have a concern, though. While we all want to see a modal shift to public transport, we must recognise Ireland's dispersed rural communities. It is accepted that electric vehicles will be an important component if we are to meet our emission targets.

Dr. Windisch referred to reaching a point of equilibrium between the price of a conventional vehicle and the price of an electric vehicle. Has she modelled when that might happen? She spoke about providing incentives to people in more rural areas, as opposed to those who lived in cities. Since the money to support such an incentive is a finite resource, has she carried out any work on that proposal or is she aware of any examples of where it has been done in other countries? Of course, this assumes it is legally possible to incentivise based on geography and dispersed rural communities, as opposed to incentivising the whole population.

Dr. Elisabeth Windisch: On price parity, I must refer to research done by other organisations. Based on what we are hearing currently, and what we believe, price parity could be achieved in five to six years. Past forecasts on price developments have been surpassed in the positive, meaning that prices have been falling quicker than we had assumed. This is positive news. I think that price parity will come into play before 2030.

On how to incentivise more rural areas, I admit this is more of a theoretical concept for the time being because I do not know of any place where it has been done at national government level. For me, the best way to go about this would be to find a way to help local authorities to help their populations to have access to this kind of vehicle. It would have to go via the route of helping the local authorities to provide respective supports. I have not yet seen that happening at a national level.

Chairman: I thank Dr. Windisch. The next speaker is Deputy Bruton.

Deputy Richard Bruton: I thank the witnesses for their interesting and worthwhile presentations. I have a few questions for them. It seems to me vehicle sharing is very low hanging fruit in some ways if we could get that going on a scale. Is there experience in other countries of how it has been scaled up rapidly? Are there support networks? I know it is in the main done through the private sector.

The other point which appeared to be slightly in dispute between the speakers, in particular Dr. Windisch and Dr. Sloman, is whether to price first or to wait until one has the solutions be-

fore introducing pricing on roads, congestion charges and carbon charges. Would the witnesses care to elaborate? Les gilets jaunes in France showed the risks of pricing first. Dr. Sloman said that without prices - an economist would understand this - assets will be insufficiently used and so one over-invests. I can see the arguments on both sides but I would welcome a comment from each of them on that because it will become a hot political issue. I heard Dr. Windisch reference in particular the importance of getting people on board. Where does that fit in to pricing and so on?

My next question is to Professor McKinnon. How far has industry come on board? Some companies have set net zero targets by 2050 as part of their corporate social responsibility, CSR. I understand that in the UK the Bank of England is taking a fairly aggressive approach to financial institutions looking at the risk profile of their investment. Presumably, it looks intensely at freight as one of the areas where one could have stranded assets and so on. How do we get leverage within the private sector without Government subsidies, taxes and so on which will create competitiveness problems?

I have one final question. I was involved in government when approval was secured for the national broadband plan. It was extraordinarily difficult to get that through the investment appraisal approach that Government takes because it takes no account of the potential increased usage of a new infrastructure. It tends to use a static model, taking the view that the same proportion of people will use it into the future as currently use it versus time saving on a road project which it is used to modelling. Is there a new approach to project appraisal, not just on the roads and national broadband plan, but generally, to take into account, as Dr. Windisch said, the new risk environment in which we are living, but also the new opportunities that are out there in a digitising world that make traditional project appraisal outmoded in that it often misses many of the real opportunities for transformation?

Chairman: Deputy Bruton has raised some good questions for Dr. Sloman and Dr. Windisch, with a particular question on freight for Professor McKinnon. I ask the witnesses to be as succinct as possible in their responses, recognising that these are very good questions and they may need some time to deal with them. I call Dr. Sloman.

Dr. Lynn Sloman: On car sharing, the big opportunities are around work with large employment sites encouraging their employees to car share. That can work very well in the context of parking management and restraints. One of the recommendations of the recent commission, in which I was involved on behalf of the Welsh Government, looking at alternatives to building another section of the M4 motorway was the introduction of a workplace parking levy for large employers with car parking facilities and to provide supports for car sharing so that there would be the carrot and the stick and for that regular journey car sharing would come to be seen as attractive and sensible. There are initiatives such as parking cash-out under which people get paid for the days when they do not drive their cars to work, which has worked very effectively in North America and has been used to a limited degree in the United Kingdom by companies such as the pharmaceutical company, Pfizer.

On the question on road-user charging and whether it should be done before or after improving the alternatives, the answer is both. One has to deliver upfront improvements and people have to feel that there are decent alternatives. I was involved in Transport for London at the time road-user charging in the form of the congestion charge was introduced in central London. It followed a period of about two years in which the then mayor, Ken Livingstone, had put very high priority on improving bus services, including the introduction of a £1 flat fare for bus services and improvement of the quality of the bus network. That meant that people understood

that they had alternatives and they were getting better. The narrative that the congestion charge or eco levy, which might be more of a pay-per-mile scheme, provides the revenue that enables us to carry on improving public transport and creates the political and public narrative in support of it. It is about upfront investment in improving the alternatives, but also accepting that if we waited for the perfect public transport system and cycle infrastructure, we would never do road-user charging. We have to do enough to ensure people have an alternative and to then continue to improve those alternatives.

I do not have a great deal to say on appraisal, except that I very much agree with Deputy Bruton that the current appraisal methodologies are not fit for purpose. There are severe problems with the way in which, over many years, a super-structure has been built up on rather faulty and flaky foundations related to many thousands of drivers saving small amounts of time. That does not work and it does not serve us very well in appraising public transport and active travel schemes as well as, as mentioned by the Deputy, broadband.

Dr. Elisabeth Windisch: I agree with everything Dr. Sloman said and I will add a few points. On the shared vehicle question, when speaking about vehicle sharing and what would be the most efficient concept the International Transport Forum is speaking about the provision of on-demand minibus services that can cover distances and geographic areas where mass public transport does not work because density is not high enough yet. This on-demand minibus service could support the mass public transport system. We have not seen such a solution put in place on a large scale on purpose but such systems do exist, driven by necessity. Large metropolitan areas in many Latin American cities, for example, often have a less regulated system of minibus services. They operate on certain routes but as they also want to increase their profits they frequently divert from those routes, which causes other issues, to make sure they cover the area they want to as well as possible and work at capacity. These examples can help to determine the benefit of such systems and the capacity they have in terms of covering people's movements around large metropolitan areas.

On the question of pressing, one cannot wait until everybody has shifted to the alternative and is happy with it before one starts pressing it. It has to go hand-in-hand with other measures. People should at least have the perspective of an alternative as a minimum.

I refer to the necessity of road user charging. Let us think about the large-scale uptake of electric vehicles. Economies will fall significantly short in terms of tax revenue from fossil fuels following a large-scale shift to the use of electric vehicles. This is how Ireland wants to go forward. Many countries rely on electric vehicle uptake. They would, therefore, be well advised to introduce road user charging rather earlier than later in order to avoid a complete backlash from the population.

These pricing systems are not only a necessity for some countries; they can be reinforced if they are implemented properly in line with the polluter and user pays principle in line with what the European Commission suggests. That can drive the uptake of electric vehicles even further. It is a win-win situation. It is a necessity while at the same time helping with the push towards electric vehicles.

Professor Alan McKinnon: I have worked on decarbonisation logistics for about 15 years. I have witnessed a real step change in the level of corporate commitment to cutting emissions at a business level. That percolates down to their effort to decarbonise their logistics and supply chains as well.

I mentioned our recent survey, which was reflected in the responses we received from the companies. It must be remembered that a lot of logistics is outsourced. Therefore, the basic activity is performed either by big logistics companies like DHL or, in many cases, by small companies. The big manufacturers and retailers are, therefore, hoping that their logistics providers will decarbonise on their behalf. They are putting increased pressure on those companies to do so.

One of the problems with the freight sector, which applies in particular to road freight, is that it is a highly fragmented industry. Across Europe as a whole, there are over 500,000 small carriers. It is an intensely competitive industry. Many companies struggle to survive. Therefore, it is hardly surprising that they do not have the time, effort or resources to put into decarbonising their operations. We carried out another study recently on what needs to be done to motivate small carriers to cut their emissions.

One of the other positive things I would say that there is a close correlation between cutting carbon emissions and cutting costs in the logistics sector. There is a widespread feeling that we are still in what might be called the low-hanging fruit phase of freight decarbonisation. A lot of the initiatives that will save carbon will cut costs and often have a very short repayment time. Regrettably, harvesting all of that low-hanging fruit will not get us to our carbon reduction targets for 2035, 2050 and thereafter. It will, however, get companies started on the process of cutting their emissions.

My final point is that these are science-based targets. An increasing number of big companies are signing up for science-based targets, which means they are committing to absolute reductions in emissions, not just reductions on a carbon-intensity basis. That matters a lot in the logistics world because until recently almost all of the carbon reduction targets for logistics were carbon-intensity based. Now companies are looking at ways of getting the numbers right down to zero by 2040 or thereafter. They are some positive comments.

Deputy Jennifer Whitmore: I thank the witnesses for their really interesting contributions. I have a question for Dr. Sloman on the roads building programme. We are in the middle of revising our national development plan. In 2018, €5.7 billion was committed to road building. Does she believe that there should be a complete stop to road building at this point or would it be more appropriate to examine the environmental considerations and perhaps have them built into the decision-making process when it comes to road building?

Is free public transport something that should be part of our transition? In my opinion, it would encourage people who do not normally and culturally use public transport and might actually be an entry point for them into the system. Would Dr. Sloman see that playing a large part in our transition to a public system? Where has it worked well in other areas?

Chairman: Are those questions for Dr Sloman?

Deputy Jennifer Whitmore: They are for any witness who might have thoughts on them.

Dr. Lynn Sloman: The first question on road building asked whether it is a question of stopping it altogether or building in environmental considerations. When we have assessed road schemes, it is generally the case that they result in an increase in traffic because increasing road capacity encourages more car-dependent development. It typically also results in an increase in vehicle speeds. If vehicle speeds increase from 60 mph to 70 mph that would result in an increase in vehicle emissions of, on average, about 13%. It is very hard to square road building

with a strategy of urgently needing to reduce carbon emissions.

We should be stopping new road building. There may be certain very exceptional cases where it makes sense from a safety perspective to put in place some sort of change in the design of a road, but what we should not be doing is increasing road capacity. If we are looking to reduce traffic mileage, we do not need to increase road capacity in most cases.

On the question of free public transport, I absolutely agree with the Deputy that it could encourage a wider range of people to experience public transport. France is going through a very interesting phase at the moment whereby towns are making local public transport free. Dunkirk introduced free bus services in September 2018, just over two years ago, and at the same time as making its services free it also put in place some improvements to the bus service. Bus use increased by about 85% in the space of one year. The mayor of Dunkirk is on record as saying that people tried the buses because they were free and carried on using them because they are good.

The idea is that we should consider trying to get people to sample bus services by making them free. In many jurisdictions making bus services free is cheaper than one might expect because they are already very heavily subsidised by the state. It is certainly true in France. To a degree it is true in Wales. The additional funding that one needs in order to make bus services free is relatively limited. The environment benefit of that in terms of enticing people to change their whole lifestyle can be very significant. The common charge people make is that it is no good if buses are made free and there is no decent bus network. Therefore, it is also essential that a high-quality bus service network is created. The Swiss idea is to have a public transport service frequency standards that say that if one lives in a village of a certain size, one will be entitled to a certain level of bus service. That seems to me to also be an essential part of that package. It is about making the service both free and good. Those are my main comments on those points.

Dr. Elisabeth Windisch: A case study example of another European city would be Vienna, which has introduced fairly cheap public transport many years ago. It costs €365 per year for a public transport pass that carries one around the whole city. The uptake of this was immense and the mode share of public transport is clearly above average. The international community looks at Vienna as a best practice example, so it could also be an example for the committee to look closer into.

Senator Alice-Mary Higgins: I thank the witnesses for their extremely interesting presentations. It strikes me that it is about a huge shift. So much of the transport focus has often been on reducing journey times when in fact this is about reducing journeys and thinking in terms of emission miles. Whether the target be 6% or 20%, the committee needs to set targets down to the level of emission miles and not just in car ownership and so forth. I was struck by the importance of things that might not seem to be directly related to emissions such as having places that are nearby, be they post offices or public amenities. I was also struck by the idea of rural schools being part of our climate response. Shared school transport seems to be another low-hanging fruit and an example of where we could be doing things a lot better. Digitalisation, which was mentioned by everybody, is also interesting. I know that needs to be accompanied by physical infrastructure as well as upskilling because 50% of the population in Ireland are digitally disempowered in that they do not have basic digital skills.

I mention targeted measures around electric vehicles and bikes. Dr. Windisch and Professor McKinnon might look at this. Is there something around the last mile idea that we could be

doing? When it comes to freight, I mention last mile delivery, empty vehicles and idling. We should use much smaller vehicles for the end stage of freight delivery. Are there examples of where that is working well?

I also want to ask Professor McKinnon about freight and the TEN-T reforms in respect of ports and rail. The individual rail journeys in Ireland are quite short and we have rail connections between Rosslare, Cork and Dublin, as well as Belfast from a shared island perspective. How can we look to be more ambitious about how we connect port and rail freight and make a bigger case in that regard, possibly even from the TEN-T European funding perspective? We must make sure that where freight is on roads, we keep it on motorways and that we do not have freight vehicles idling and using smaller motorways. That might require specific and targeted measures to keep freight on railways. We know we have a problem with freight going off-road onto smaller roads. Could we be using life cycle costing in procurement to really incentivise smaller vehicles for freight and shorter distances?

On the road user tax, in 2019 the committee heard that we are in fact subsidising car transport to the degree of €650 per person per year. We hear a lot about road tax but we are already subsidising car usage. We can make the decision at a political level to shift our investment. Rather than waiting for a road tax to then provide money that we then might invest in public transport, we can in fact make that shift by deciding to put in place ambitious ideas in terms of public transport. The idea of public transport for every village every hour is something that I know many across Ireland would love to see. Is the case that we might need to skip the State and not rely on consumer change to fund substantial change but to front-load investment in a radically different option? The witnesses' comments on these issues are welcome. There are some exciting new ideas in what the witnesses have said that I hope the committee will be able to push forward.

Chairman: There are a lot of good points and questions there. I will go to Professor McKinnon first.

Professor Alan McKinnon: I will begin by saying something about the previous question on road construction and I will link that to the point that Senator Higgins made about routing. I agree with Dr. Sloman that any future road building should be targeted towards areas where there is a particular problem. Looking at it from a freight standpoint, if trucks get held up on congested roads then there is a big fuel penalty associated with that. Therefore, if there is a severe bottleneck there may be some limited justification for road building.

It seems to me that if we fill the vehicles better we would reduce the amount of vehicle traffic on the road. I do not have the figure for Ireland but in the UK, freight vehicles represent about 7% or 8% of the entire fleet. Cars dominate the flow of traffic. I mentioned digitalisation a few times and the way we can deploy a range of IT tools to help with this. A lot of companies are using this to dynamically reroute their vehicles once they are on the road network to avoid more congested stretches of road, which is allowing us to adapt our freight operations to a road network which is suffering congestion in some areas. I mention the potential to reschedule deliveries into the evening or during the night in order that freight vehicles are able to travel at their most fuel efficient speeds and thereby evade daytime congestion. A lot of work is being done to look at that as well. There are a lot of alternatives to simply expanding road capacity.

If one is looking at the road building option, one must think of the carbon footprinting of the road construction process itself because often when that is factored into the calculation, one discovers that it takes many years to get a carbon payback on simply building more road space.

That also relates to the point that was made about the routing of the vehicles. I agree that sometimes drivers these days use GPS and do not realise that it is taking them onto routes that are too small for the vehicle's capacity. I am not sure if this happens in Ireland but we have had lots of examples in the UK of big trucks going onto small rural roads and causing blockages and so forth. We are increasingly talking about smart highways and vehicles and telematic systems. This gives us huge opportunity for tailoring the movement and pattern of freight delivery to the capacity of the road network. Therefore, there is a lot of potential in what Senator Higgins said.

Senator Higgins also asked the question about last mile delivery within urban areas. This is a subject that has greatly interested me for about 20 years. In terms of carbon emissions, is it better for people to shop online or to go to the shops to buy their goods? We did one of the first studies on that comparison way back in 2007 and 2008. We concluded that on balance, if the van delivering the goods to the home was well-loaded, that would have a lower carbon footprint than the person driving to a shop. Once one factors a car shopping trip into the calculation, there is a spike in emissions. It is debatable if one goes by public transport to the shops. On balance, there are things we can do to reduce the carbon intensity of last mile delivery where, for example, people do not get the goods delivered to the home but they go to a locker bank, for example. That has been shown to cut emissions. As online retailing has expanded, the volumes of freight going through the last mile have been increasing and that has been improving the load factors of the vehicles. However, there are some trends heading in the opposite direction. Many of the big online retailers are trying to differentiate themselves by being able to make a rapid delivery overnight or on the same day. When that happens, the vehicles are inevitably less well used. The load factors decline and the carbon emissions per order delivered increase. That is one worrying trend.

Another trend is the proportion of online retail products that get sent back. As much as 40% or 50% of items of fashion clothing get sent back up the supply chain. That is reducing the relative carbon advantage of using the online channel as opposed to the retail shopping channel. I draw the attention of the committee to some interesting work done by the World Economic Forum and McKinsey about a year ago. They looked at 24 things that can be done to reduce the carbon intensity of online retailing. It included some of the things I have just mentioned, such as locker banks. Other things included switching to electric vehicles and so forth. Combining that range of initiatives would allow us to significantly reduce the carbon emissions from last mile delivery.

The Senator also mentioned procurement. It has a critical role to play. I mentioned earlier that, in logistics, so much freight and warehousing is now outsourced that the big manufacturers and retailers can get leverage on the carbon intensity of those operations through the way they procure those logistics services. There is other work being done these days by, for example, the smart freight centre in the Netherlands, giving companies advice on how they can buy freight services in a way that will minimise carbon emissions. That has been a rather long answer but the Senator raised a range of issues in her question. I thank her.

Senator Alice-Mary Higgins: I am conscious that there is not that much time left so perhaps I could get a written answer to the question about port and rail freight.

Professor Alan McKinnon: I will do that.

Chairman: I thank Professor McKinnon for that detailed answer. As Senator Higgins suggested, we would be interested if the professor would like to follow up with any kind of written supplementary evidence. We would appreciate that and the same applies to Dr. Sloman and Dr.

Windisch. Would Dr. Sloman or Dr. Windisch like to add to Professor McKinnon's comments?

Dr. Lynn Sloman: I would like to add a couple of sentences, if I may. Senator Higgins talked about the need to have hard targets for miles travelled. I absolutely agree. I call for the committee to recommend hard targets for absolute reductions in car mileage or absolute increases in sustainable transport mode share. In the work that we did for the Welsh Government, we could see that electrification would get us perhaps three quarters of the way to the 2030 targets but it could not get us the whole way there. We were also conscious that if the rate of vehicle electrification is not as fast as is hoped, a large gap appears. Having hard targets and holding Government to account in respect of them feels to me to be very important.

I will not speak to it now but I will send some information about "every village, every hour", the slogan that has been adopted by Nordhessen in Germany. The Germans are deadly serious about achieving that and it might be an interesting example. That was all I wanted to say.

Dr. Elisabeth Windisch: I will make one point about digitalisation and how it can play a significant role, and will have to, in encouraging the uptake and more habitual use of public transport. I am sure the committee has heard of the development of so-called mobility as a service which heavily relies on the use of digital infrastructure and making public and private transport providers work with each other. This is a development that should not be missed and a lot of work should be put into it because it can facilitate public transport journeys and having intermodal journeys, especially in an urban area such as the greater Dublin area. I encourage the committee to look into that to ensure that Dublin is a front runner in implementing such a holistic digital system to make public transport and other inefficient services work.

Senator Pauline O'Reilly: I thank all of the witnesses. This has been an enjoyable session and I appreciate their time. My first question is for Dr. Sloman. There is a misconception that if we put enough money and time into this modal shift, we can keep going along the same mode at the exact same time. In that context, I appreciate all of Dr. Sloman's comments. Is it her contention that we will be unable to do both because we will not have the money or is it because the targets are so difficult to meet that we do not have the time to do both?

There was mention of remote working. Wales is setting an ambitious target of 30% in respect of remote working. Dr. Sloman has spoken about moving investment from roads into broadband. Are there smaller ways in which we could try to prepare? We are, obviously, rolling out broadband and we have put significant investment into that. Are there other ideas that could help us with that move to remote working because it could be transformative for Ireland?

Dr. Windisch mentioned the 15-minute city. There is another misconception that the 15-minute city means as the crow flies when one can be in a 15-minute city but it can take half an hour to get around it if there are barriers in place. Some of those barriers are actually very cheap to remove. Do our guests have some ideas on that? I am thinking, for instance, that children sometimes cycle for kilometres to a destination when they could just nip over a wall if they did not have a bike with them. What about permeability, kissing gates or any other ideas like that? Is there low-hanging fruit that would get us to those targets? What is Dr. Windisch's opinion on road building and how it can take us away from that 15-minute city, never to return, because of the kind of planning that is set in motion? She also mentioned the forthcoming report that suggests that if 20% of car users in the Dublin area shifted to shared mobility, 40% less street space would be required. There is an argument that if we build more roads we can move people out of the space and then leave the space for people to cycle and walk on, and use public transport. That seems intuitively incorrect. What is Dr. Windisch's opinion on whether that is the correct

way to go about things and put our transport plans together?

I also have a question about freight for Professor McKinnon. We are trying balance our climate ambitions and regional development. That regional development would mean that people would not have to travel as far to work and so on if we can build up industry in, for example, the north west. We have decommissioned rail lines that could be used for freight. An alternative to regional development may be that we would have to develop our road structures further. The options are a rail line, developing roads further or not developing in those areas at all. The professor mentioned that moving to rail may not be commercially viable. Has he looked at that commercial viability for an entire community or region, also taking into consideration governmental investment as opposed to investments by individual companies in rail freight?

Dr. Lynn Sloman: I thank the Senator. I think I am right in understanding that her first point was around road building. She was asking if we should not build roads because we do not have the money or because the targets are so challenging that we do not have the time. It is the latter. To achieve the reduction in carbon that we need to achieve is very challenging indeed. Road building that increases road capacity and opens up land for car-dependent developments will make it impossible to achieve a modal shift away from driving and towards travel by public transport, walking and cycling. Of course, if we do not need to build roads then we save money and can invest that in sustainable transport. It becomes a virtuous circle. Fundamentally, a large road construction programme is not compatible with taking the climate emergency seriously.

On the point made about remote working, one of the things the Welsh Government is looking at is the idea of super-fast broadband-enabled remote-working hubs. We all know from the last year, it is fine working from home if one has a spare office or a spare bedroom to work in but many people, particularly young people, may not have a good space to work in. There may be noise from children and it may be difficult to work from home. One of the things the Welsh Government is looking at is repurposing either public buildings or supporting the private sector to develop remote working hubs so a person can cycle a couple of miles to his or her local remote hub and work from there rather than having to drive 15 miles to his or her office. That is still at the discussion stage within the Welsh Government. It is an idea that seems very worthwhile.

I will make one point about the question directed at Dr. Windisch around street space requirements and the efficiency in the way we use our street space. In London, Transport for London built the cycleway over Blackfriars Bridge. The cycle lane is able to move as many people as would be moved in two and a half lanes of general traffic but it only takes up half the space. One could say it is five times more efficient. In general, the cycleways in London - the east-west and north-south cycleways - have more capacity because they have cycleways and more people can be moved on those corridors than could have been before the cycleways were built. Reallocating road space to more efficient modes, whether to buses or to bikes, actually makes the city function more efficiently. It is a very sensible thing to do.

Chairman: As we have under half an hour remaining, I want to be fair to all members. There are four who want to come in but have not yet. I ask witnesses to be as brief as they can in giving their answers so we can be fair to those members.

Professor Alan McKinnon: Looking at the link between regional development and decarbonisation of freight, if we are talking about a peripheral region then the length of haul will be greater; therefore it might make it more competitive for the rail industry to capture that traffic. It depends on the nature of the industrial development in the peripheral region. What are the

products being produced and distributed from there? It is clear the railways have an advantage in the moved primary commodities, which are the lower value things. It is hard to generalise about that. People often think there is a conflict between the desire to cut carbon emissions from an economy and promoting regional development because the thinking is we should try to shorten the distances over which freight is moved. That does not necessarily apply. If one can use a lower carbon transport mode, then that is certainly beneficial. Through time, the carbon intensity of freight transport will reduce. Carbon emissions per vehicle-kilometre, per tonne-kilometre will decline and therefore the carbon penalty associated with developing industry in a peripheral region will reduce as well. It is hoped the two objectives of regional development and decarbonisation will ultimately be compatible. They are some of my general thoughts in response to the member's question.

Dr. Elisabeth Windisch: There were a few questions around the 15-minute city and how to never return. It will be quite natural to never return because once we are there people will see very well the benefits and enhanced liveability of the cities so I would not be worried about this. Encouraging low-hanging fruit is mainly the responsibility of local authorities. They should be encouraged and have financial means available to do this, maybe through simple infrastructural measures, which can contribute a lot.

On the argument that one has to build more roads in order to facilitate the 15-minute city, I refer members to what Dr. Sloman said because she has said it all. We definitely do not need to build any more roads to facilitate the efficiency of our transport systems.

Senator Pauline O'Reilly: I meant it the other way around - never to return to a 15-minute city if one starts building roads. I speak from the other perspective that one loses the ability to build 15-minute cities if one builds more roads.

Dr. Elisabeth Windisch: Yes, of course.

Deputy Darren O'Rourke: I will try to be brief with my questions. It strikes me that we have well established structures for finding and delivering solutions to roads problems. Could Dr. Sloman speak about her experience in Newport and the road in Cardiff Airport, as the Chair mentioned? We have many examples in Ireland, and I presume elsewhere, of real problems with congestion on a daily basis. The solutions which are proposed and most often delivered are wider and bigger roads. I am interested to know whether there is a practical example of an occasion where there was a roads solution on the table and an alternative was delivered. In my experience, most people want congestion removed and their lived experience improved on. I am interested in that. Do the witnesses believe there is a need for a mindset change, a governance change or a governmental change in terms of our Departments' assessment tools, and the training of our transport professionals to achieve that mindset change and consideration of the new dispensation?

What is the comparative experience of Dr. Sloman and Dr. Windisch in Britain and internationally? The Irish challenge relates to the geographically dispersed nature of many of our communities. We have a particular challenge in the geographical distribution of our communities in which we have low density. Would the witnesses have any suggestions taking the comparison between London and Wales, for example, of policy priorities? What should we be looking at and are there good international examples? Does it involve school or bus transport, car sharing, demand for transport or something else?

Can Professor McKinnon speak about the development of the technology for batteries and

hydrogen for freight, and the performance, availability and affordability of that? I note there was a significant Government incentive and support for the sector here in recent days, which was well received by the sector. Are there other examples of similar interventions?

Dr. Lynn Sloman: Deputy O'Rourke's point is about the south-east Wales road scheme that was cancelled, the extension of the M4 motorway to go to the south of Newport. That scheme had been on the books for probably 25 years. It was perceived as a scheme to solve a congestion problem during peak hours when traffic speeds on that section of the motorway where it narrows down to two lanes and goes through some tunnels can fall to 25 mph and journeys are unreliable. The environmental cost of building another section of motorway - to dual the motorway, if one likes - was massive and the Welsh First Minister made the decision not to go ahead with the scheme. I will send the committee the final report of the South East Wales Transport Commission, of which I was a member, which examined what could be done to solve that congestion problem without building more motorway. We developed some recommendations, including increasing the number of stations, improving rail infrastructure, tackling bus governance - the lack of which is a big issue in the whole of the United Kingdom - and regulating bus services again, which is a big problem for us, in order that we could provide a comprehensive integrated network and a network of cycleways and bus priority measures. It will take time to implement that package but we were absolutely confident at the end that it would provide a better solution to congestion on that section of motorway at lower cost.

On the challenge of geographically dispersed communities, the places to look at are the rural hinterlands of cantons in Switzerland. Many areas of continental Europe do this well. Dr. Windisch has referred to Austria, Germany has some fantastic public transport networks in rural areas. The best of the best are areas such as the cantons of Zurich and Bern where rural areas have guaranteed service levels. Administrations in these areas tend to favour fixed public transport networks over demand responsive transport because people trust that and believe it will always be there for them. For this reason, it attracts more users than a demand responsive service. Those are the places that can offer lessons for rural areas in Ireland on how to provide people with an effective alternative to driving.

Chairman: Would Dr. Windisch care to speak on geographic distribution and how we resolve that?

Dr. Elisabeth Windisch: This is definitely one of the trickiest parts to decarbonise. It is also why I suggest that this be one of the focal areas for the deployment of electric vehicles. The International Transport Forum has a working group looking at precisely this issue. It is not doing so specifically from a decarbonisation perspective but more from a perspective of how to ensure connectivity to such areas, not just dispersed but also rural and disconnected areas, because some countries have to consider connection to islands. We are working closely with some Scandinavian countries and looking at these countries could also be helpful. As Dr. Sloman said on transport services, this could be an option but these areas especially may not experience the uptake they could or should. If it is really a non-dense, very partially populated area, on-demand transport services would not be economically viable. There should be innovative new solutions. I fear I do not have the perfect answer other than that I encourage these as the priority target areas for the uptake of electric vehicles.

Chairman: Will Professor McKinnon comment on technological developments?

Professor Alan McKinnon: The choice of low carbon technology for vans and trucks is a big subject which could take me the rest of the afternoon to explain, so I will try to keep it very

brief. In the case of vans and small rigid vehicles, it will be battery electrification without question. Already, the total cost of ownership for a small van for an electric vehicle is comparable with that of a petrol or a diesel van. I think that process will continue. The challenge is more at the long-haul end for the heavier trucks where the options are battery, hydrogen fuel cell, possibly biomethane, although there is not very much of that, or e-highways. I point out that in Germany and Sweden, for example, they are trialling the electrification of highways. Analysis has shown that if there is a sufficient volume of truck traffic, that can be quite a cost effective way of decarbonising long distance road freight.

There is a big push at the moment for hydrogen for trucks. I am a hydrogen sceptic. Almost all the hydrogen we have at the moment is made from methane. It is, therefore, essentially a fossil fuel. It will take a long time to get to green hydrogen where we make hydrogen with zero-carbon electricity, electrolysing water. When we do that we waste a lot of energy in that electrolysis process. We can waste as much as 70% of our energy. That may be an option in big countries where the trucks have a long distance range such as the US where they may have to travel 1,000 km. However, because Ireland is a relatively small country and the length of haulage is relatively short, the new generation of truck batteries will be perfectly capable of handling that sort of distance range and would be a more efficient measure. The issue will be the cost of these trucks, which are not available yet. The first battery-powered trucks will probably be mass produced in the next two or three years. I noticed in Ireland's case, the Irish truck fleet is a bit older than the EU average. It takes about 14 years for Ireland to replace its truck fleet. When these low-carbon vehicles become available, it will not help much in getting Ireland to its 2030 target but it will help to get to the 2040 and 2050 targets.

Deputy Réada Cronin: I thank everyone for their presentations. My first question is for Professor McKinnon. I used to work in freight transport. Professor McKinnon gave an example of using rail for freight travelling just 40 miles. Is that new? Will he elaborate on that? We very rarely use rail for freight. In my time, we did not deal with goods that would go off. We have the just in time principle. A cultural change is required in industry to address our addiction to having things immediately. Professor McKinnon said Ireland was so small that he could see the reason rail is not a significant mode of transport.

Dr. Windisch and Dr. Sloman spoke on the remote working hubs in Wales. Wales would be considered a rural country and Ireland also has many rural areas. There is a need for a complete change in thinking. The lack of thinking that got us to this place of peak pollution and global warming will certainly not save us. The witnesses spoke about free transport. The Netherlands has more bicycles than people. Is there any merit in considering free bicycles for children so that they get into the habit of cycling and will always use them? Does any country do that?

Professor Alan McKinnon: The example I was thinking of when I spoke about the 40-mile transit for rail is in Scotland. It is from a whisky distribution centre to the Port of Grangemouth for exports, where there is a very regular high-volume flow over that distance range and it works viably. I concede, however, that this is exceptional. Many people think that railways require a length of haul in excess of 200 km to be viable. There are examples from the past of short distance viable rail movements where there were merry-go-round services from coal mines to power stations. However, that type of transit is obviously a thing of the past as countries have been getting out of coal powered electricity.

Another issue of modal split is that the railways will have a problem increasing their share of the freight market because one of their core traffics has been fossil fuel - coal and oil. As we use fewer of those primary products, it is going to be tough for railways to replace those prod-

ucts with higher value manufactured goods. Again, that is another factor we may have to bear in mind when thinking of the Irish modal shift.

Dr. Lynn Sloman: The idea of offering free bikes to children is lovely. I do not know of any country that does that. One of the things that I am familiar with is the grants which a number of European countries have offered to people to incentivise the purchase of electric bikes. That has been quite instrumental in growing the electric bike market over the past ten to 12 years. I may send some further information to the committee about how successful that has been. The UK's Deputy for Transport is looking at an electric bike grant scheme as a possibility because it has seen how effective such schemes have been in continental Europe.

Dr. Elisabeth Windisch: There are many employer benefits that encourage the use and uptake of private cars. This could also substantially shift to a system where employers actually support the uptake of bicycles, and cover the costs of the purchase of the bicycle and its use. I know that the use of bicycles is very limited but there could be an opportunity to maybe provide other incentives to encourage people to shift towards using bikes for commuter or work trips instead of private cars. Specific examples where the uptake of bikes has worked were sought. I do not have a specific example in respect of children. In the recent past, I worked in Latin America. Sorry again for giving an example from there. In the city of Bogotá, cycling has increased a lot, which is maybe something that one would not think of happening in such a huge metropolitan area that is unsafe. That is exactly my point, however. There are a lot of improvements that can still be made to encourage a shift to bike usage. I refer to safety and infrastructure measures that encourage the uptake of cycling.

In terms of children specifically, an emphasis must be placed on communicating what we need to do, educating children and the necessity for us all to act as role models. Therefore, we should act accordingly and be examples for our children.

Deputy Christopher O'Sullivan: My question on rural areas is for Dr. Sloman. She covered much of what I wanted to ask when she responded to Deputy O'Rourke. The idea of moving to electric vehicles and creating cycling superhighways has quite often been met with a great deal of scepticism in rural areas. People think that these initiatives would never happen in their areas but I guess it is up to us to lead and to change attitudes.

In the past 12 months there has been a significant investment in cycleways, greenways and cycling lanes. In rural areas like the one from which I come, however, we do not have shovel-ready projects that would, with a bit of investment, lead to connectivity between rural areas and towns, villages and towns and between towns. As has been mentioned, part of that reason is the geographical nature of these areas. They have a lot of hilly topography and other geographical features that create difficulties. Much of it is down to the fact that we have intensively farmed agricultural lands so there is a reluctance straight away to see features developed. It has been mentioned that we could analyse the model used in the Swiss cantons, which is certainly worth examining. Is the answer an electric light bus service that regularly serves towns, villages and smaller rural settlements?

Cycling superhighways sound absolutely fantastic and are something I would love to see rolled out. However, from the experience so far, I can see immediately that there are barriers to such a scenario and an attitude of "Why can't we do it" as opposed to "How do we do it?". We used to have a terrific rail service but, unfortunately, all of the tracks were lifted and the land is now used for agricultural purposes. The idea of returning to the previous scenario in this regard has also met with a lot of scepticism. I will consider the Swiss canton model. Would a regular

electric bus service that would be subsidised by the State in order to make it affordable be an option?

Chairman: As we are tight on time, I ask Deputy Devlin, who has waited patiently, to pose his question now so the witnesses can reply to both of the Deputies.

Deputy Cormac Devlin: The discussion has been fascinating. I thank all of the witnesses for their contributions.

Dr. Sloman spoke very passionately about what has happened in Wales. One of the elements we are talking about is the use of electric vehicles and how that can be facilitated, particularly in major towns and cities in terms of the infrastructure that is required, such as through the provision of charging points. I ask her to allude to how much work has been done and progress made on that to facilitate the transition to electric vehicles.

I thank Professor McKinnon and Dr. Windisch for their contributions. Professor McKinnon mentioned freight and I want to talk about regional aspects for the greater Dublin area, Leinster or whatever. How do policymakers look at challenges on a regional basis rather than just in the context of one local authority or municipal area? I ask because, to me, that is one of the challenges that we would face. For instance, car- or bike-sharing schemes are very popular but sometimes different areas want to do their own thing. They are not all matched up on a regional basis so I would like to hear their own thoughts on that issue.

In terms of public transport, the issue of bus priority and carpool lanes has been touched on. What do the witnesses think of public service vehicle lanes? Do they think they have a place in our transition?

Chairman: As Deputy Bríd Smith has also been waiting, I will bring her in now. I ask her to be as brief as possible so that witnesses will have enough time to answer.

Deputy Bríd Smith: I thank the Chairman and I also thank the witnesses for their contributions.

Dr. Sloman is knowledgeable about the cities, towns and countries that have introduced initiatives. Can she tell me the imperative for the introduction of initiatives? My party made a proposal that called for free public transport and had it costed. Dr. Sloman is absolutely right because we were astonished at how little it would cost to change from subsidised transport to free public transport. Unfortunately, our proposal did not get political support in this Parliament. What was the imperative? What particular set of circumstances, political or otherwise, led to transition and, consequently, good results in Dunkirk, Vienna and all of the other places that have been mentioned?

There was talk about the provision of public transport being fixed rather than demand responsive, and how that is, particularly in rural areas, the trick to ensuring that a service is used frequently and that cars are taken off the road as a result. Does the latter imply that the privatisation of public transport would be ineffective?

Chairman: I would appreciate if the witnesses could answer the questions together. Plenty of questions have been asked but there was also plenty of overlapping. I will go to Professor McKinnon first.

Professor Alan McKinnon: On the relationship between regional development and decar-

bonisation, it depends where the boundary is drawn. Some countries are trying to decarbonise, while some cities are setting carbon reduction targets, and presumably, they will want to do that for activities within that boundary. If the same is done at a regional level, the problem is that any region will be criss-crossed by many supply chains. There will be a great deal of through traffic. A former colleague of mine examined how a region in England could be decarbonised. Running through the region was a major motorway on which there was heavy truck traffic. Should that be included in a carbon calculation? Such issues will be encountered.

Clearly, if a region expands its economy, is more vibrant and can become a bit more self-sufficient, that will be beneficial because it will reduce the quantity of freight-related emissions, but it is difficult to do that because of the structure of modern supply chains. Very few economic sectors are localised to that degree. I often think, therefore, that if we are decarbonising freight transport, we should not be thinking about it at a local or regional level but rather at a national level to take account of these interdependences between the various supply chains.

Dr. Elisabeth Windisch: To respond specifically on the issue of public transport lanes and whether they have a place, I think they definitely do. Experiences have shown they have a significant impact on, first, the quantity of emissions from the vehicles themselves because they have priority, need to stop less often and so on, but also by making the public transport system more efficient and user-friendly because travel times can be reduced. I would definitely recommend introducing public transport lanes where possible.

On shared mobility and how this may be in conflict with other local areas, at this stage we should not over-regulate matters but rather let micro-solutions evolve. We should have a system in place that can bring together different solutions on a more regional or even national level, which will be facilitated by digitisation and the digital solutions that are likely, such as mobility as a service, as I mentioned, whereby different providers can be brought together to ensure that the system as a whole works rather than being a system of single providers working individually.

Dr. Lynn Sloman: There may be some questions for which I can send some information to the committee after the meeting. On the question of what was the imperative to introduce free public transport, in some places such as Dunkirk that was about restoring people's belief in their town. It was about creating a sense of pride in the place where they live and regenerating the town in order that the young people will want to stay there. It is absolutely the case that Dunkirk has been the focus of great national and international interest, and it has been a massive success, not only from an environmental point of view but from the point of view of people just believing in their city again.

We have free parks, free public libraries and sometimes free museums. We have all sorts of wonderful cultural assets in our towns and cities, but if someone lives in a city where he or she cannot afford to travel to those places, that is not so great. There is a growing awareness that perhaps free local public transport should be part of that universal basic right to a good quality of life. Although free public transport can be beneficial by getting more people to use public transport and being a help in terms of achieving our carbon objectives, the driving force behind it is about cities wanting their residents to believe in the place where they live and to feel proud of it.

To respond to Deputy O'Sullivan's point about what we should do in rural places where cycle superhighways do not seem to be a serious option, other European countries have had the exact same struggles. Take the example of the cycle superhighway programme in the capital

region of Denmark. Copenhagen has been building cycleways for 20, 30, 40 or 50 years, but the surrounding rural area around the city has not been doing that and it has been a complex, tortuous process to get all those surrounding rural areas to agree it makes sense to invest the money and buy land to provide those cycleways. We see these things in other countries and think it must always have been like that, but it was not. It is worth being ambitious, and if it is impossible to imagine doing it nationally at the start, perhaps it should be about trial projects and asking what we can do for rural cycling and making it an attractive option. If that is done in terms of cycleways parallel to national roads, perhaps that will be easier than dealing with roads controlled by local authorities.

I will send some information to the committee regarding cycleways in Denmark and on the cantons of Zurich and Bern and the fantastic work that has been done in those places to make rural public transport an attractive option for people whereby they know and trust that it will always be there for them, so they can plan their lives around it.

Chairman: I thank Dr. Sloman. Our time has elapsed. The quality of the questions and solutions we received today, from both members and guests, was fantastic. The depth of expertise was wonderful and it will help us immensely in the production of our report, which will hopefully be published in a few weeks. Today's session marks the last of the deep dives that the committee has been undertaking on transport emissions, so I thank the witnesses who attended this meeting and all the witnesses who attended the previous public sessions we held in recent weeks. I also thank members. The level of engagement in this committee is second to none and I think we will produce a very good report.

The meeting stands adjourned until a private session on 30 March.

The joint committee adjourned at 2.38 p.m. until 12.30 p.m. on Tuesday, 20 April 2021.