

Written evidence submitted by ITS United Kingdom (EVP0119)

ITS United Kingdom was established in 1992 as a membership association dedicated to advocating for the implementation of Intelligent Transport Systems (ITS) in the UK and for innovation in ITS. ITS can be defined briefly as the application of information and communications technologies to surface transport. We have around 150 organisations as members (<https://its-uk.org.uk/our-members/>). All members were invited to contribute to this submission, and those who did so come mainly from our Road User Charging, Smart Environment, and Connected Vehicles Forums. Our membership includes world leading experts on all three topics.

We are happy for our submission to be published.

Summary:

Zero emission vehicles

We argue that providing the right incentives to taking up ULEVs and ZEVs will be crucial to success, as will significant improvements in charging infrastructure delivering convenient and reliable charging. A suitably targeted road pricing policy can assist with this, but it is important to remember that these vehicles still contribute to congestion and public health issues arising from sedentary life styles. Generous exemptions for these and any other type of vehicle also mitigate against a road pricing scheme addressing the fiscal shortfall in fuel duty.

Road pricing

Regarding road pricing, there is no non-commercial organisation in the UK with greater knowledge of road pricing technology than ourselves. We set out the many technical options available and outline how these options work better or less well for different policy objectives. We also provide numerous examples of implementations abroad – many of our members have worked on these and are currently involved in new schemes and upgrades of existing schemes. The key point we would like to make is that these technologies are by now tried and tested, and once the policy objectives are set, then the challenge of identifying and integrating the best technology options to deliver the objectives is actually not that great. We stress that technical experts must be involved in this process from start to finish, working collaboratively with policy makers, other transport professionals, economists and crucially, PR professionals whose job it will be to communicate about the road pricing scheme to the general public. Road pricing has the potential of being a valuable policy tool for objectives such as reduced congestion, improved air quality and reduced noise pollution, and better public health, in addition to the obvious one of addressing the growing fiscal hole in road maintenance and improvement. But due to well known past communications failures, it is fair to say it is politically tainted right now, and excellent public outreach activities will be essential if it is decided to implement it.

Accelerating the shift to zero emission vehicles

1. The feasibility, opportunities, and challenges presented by the acceleration of the ban of the sale of new petrol and diesel vehicles to 2030;

1.1 Feasibility: the technology now exists that allows vehicles to be powered by batteries. These vehicles are starting to achieve performance that makes them suitable replacements for diesel/petrol driven vehicles. However this means that there must be sufficient access to stations where batteries can be re-charged or additional fuel purchased. If users feel that they have the same level of access to replacement power as to petrol or diesel, then there will be greater user acceptability of electric vehicles.

1.2 Opportunities: The UK can learn from other countries (e.g. Norway) where there has been a huge uptake in electric vehicles.

1.3 Challenge: The introduction of a road user charge for all vehicles does not compensate the extra cost of purchasing a zero-emission vehicle that is typically more expensive than the same fuel powered model.

2. The actions required by Government and private operators to encourage greater uptake of electric vehicles and the infrastructure required to support them;

2.1 Government:

- introduce regulations that give positive incentives for users to take up electric vehicles – tax breaks, support for nationwide charging stations, rules for mandatory charging stations in public places
- Regulations that give users confidence in the second hand market for electric vehicles.
- Support for R&D to improve the technology for electric vehicles – greater efficiency, greater range, etc;
- Regulations that support users taking up electric vehicles before their existing petrol/diesel vehicle expires. Users will hang on to existing petrol/diesel vehicles as long as possible if they remain economically viable to run. If the overall cost of the new electric vehicle will be a combination of the cost of the new vehicle plus the loss in value of the existing vehicle, then take-up will be slower.

2.2 Private operators – presumably this includes private operators of car parks. In this case, they can provide incentives for electric vehicles with charging facilities and perhaps even reduced tariffs. Private car parks can also include spaces at hotels where guest with electric vehicles would require charging facilities.

2.3 Ensure interoperability between EV charging station providers enabling batteries to be recharged not only with the dedicated charging station provider but with all providers (as is the case with roaming mobile networks).

3. Road pricing

3.1 The case for introducing some form of road pricing and the economic, fiscal, environmental and social impacts of doing so

General

3.1.1 Be very clear what outcomes you want – e.g. replace lost fuel duty, drive electrification, polluter pays? The form of road pricing introduced needs to be tailored to the desired outcomes.

Economic

3.1.2 roads cost money to build and maintain, and money is needed for research and development for future roads and supporting technologies;

3.1.3 Mobility choices, including private car ownership and use are changing and need to be included in the business case.

3.1.4 Spending efficiency: Typically, road-user schemes incur 80% of costs on occasional users (infrequent, foreign) who contribute 20% of revenues. Greater public acceptance can be achieved if the revenues associated with these users covers the costs.

Fiscal

3.1.5 The public believes they already pay enough for roads. Any additional “tax” would not be supported. Therefore a new fiscal model would be required that plugged the gap from lost income that is fair across all of society and reflects the idea that the user pays, and the user pays depending on the amount of use. “Amount of use” needs not be limited to number of miles driven, but can also include pollutants released in the air, damage to the infrastructure and contribution to level of congestion.

3.1.6 Road pricing is one way to replace the revenue from fuel duty assuming widespread adoption of electric vehicles, which could better reflect the externalities from driving.

3.1.7 A fixed levy per mile would closely replicate the effects of fuel duty as a policy instrument – it can be increased if you want people to drive less.

3.1.8 Road pricing is a fair and equitable way of charging for the use of the roads. It complies with the user pays principle, as payments can be geared to use.

- It could be used to fund specific infrastructure projects without the need for a separate (expensive) toll system, such as the Dartford crossing, the Mersey Gateway, the new Lower Thames Crossing etc.
- It could also replace the present HGV levy, which as a vignette is a very blunt instrument, and does not encourage desirable behaviour.
- Very low mileage road users (e.g. pensioners, the unwaged etc) may well see a reduction in the cost of using their vehicle.
- Foreign vehicles (especially foreign trucks) will be on a level playing field with UK vehicles, with less of an incentive to buy all their fuel overseas.

3.1.9 There are few other realistic options for replacing the income from fuel duty, which accounts for most of the potential £40 Bn fiscal hole. The ‘unpalatable alternatives’ include:

- Increasing tax on electricity would hit domestic users, who would resent paying more to fund road users. In any case, people would start to generate their own electricity more.
- To fill the gap with vehicle excise duty would require a massive jump in fee, and would not be seen as fair, as it is a flat fee regardless of how many miles driven. People will ask why a pensioner driving to the shops once per week should pay the same as a commercial traveller covering 100,000 miles per year?

- A £40 Bn pa cut to public expenditure or increase in general taxation is not really an option. People would again question why everyone should be worse off to subsidise road users.

Environmental

3.1.10 Road pricing, and in particular distance-based (pay-as-you-drive) schemes give the Government a whole new set of tools to influence driver behaviour. This includes the ability to manage demand by charging more for use of the most congested parts of the network, and charging more to use the network at the most congested times. Conversely, this rewards drivers who use the less used parts of the network, or who time their trips out of the peak hours.

3.1.11 Vehicles contribute to poor air quality. Anything that reduces the number of passages and/or supports the move to cleaner vehicles is a good thing. Reducing the number of passages should not impact the economy, but should mean that more working from home is happening, unnecessary trips avoided, alternative transport means supported (walking, cycling etc) and other similar measures. Fewer trips can mean that local businesses pick up the revenue lost to city centres and retail parks, rather than any overall reduction in retail, services and hospitality spend.

3.1.12 It can also comply with the polluter pays principle in that charges can be related to pollution. However, it must be remembered that clean vehicles cause the same amount of congestion as polluting ones, and that if the objective is to address funding shortfalls, then making generous exemptions for low emission vehicles will cause the scheme to fail.

3.1.13 Current clean air zones and low emission zones schemes are useful tools for obvious reasons, but for the future there is the ability to vary the charge to (for example) address pollution 'hot spots'. In this way a road pricing scheme can replace the patchwork of LEZs and CAZs.

Social

3.1.14 There is a need for us all to accept personal responsibility for our use of roads and the outcomes of that use.

3.1.15 A scheme which reduces motorised travel and increases active travel will have social and public health benefits. Walking, cycling and micromobility create much better connections between individuals and their neighbourhoods, as well as burning more calories.

3.2 Which particular road pricing or pay-as-you-drive schemes would be most appropriate for the UK context and the practicalities of implementing such schemes?

3.2.1 The DfT funded Time Distance Place (TDP) trials in 2011 and this work was very good for its time. However both technology and the market have moved on since then, and while trials should be noted, they should have limited impact on decisions taken now.

3.2.2 A national scheme (or at least one covering the whole of Great Britain) would work best in terms of being easy to understand for drivers, appearing as fair as possible, and avoiding the problems caused by routeing around charged roads. Such a scheme will need cross party support, especially since it would take more than one election cycle to implement.

3.2.3 With very few exceptions, a local highways authority could not reasonably be expected to be competent to instal and operate such a scheme, which is another good argument for a national scheme.

3.2.4 Such a system would require a secondary system for casual users, mainly foreign users in the UK for a short time. There are a number of options for this.

3.2.5 It should be clear to the public and politicians how the income from the scheme will be used. A pay-as-you-drive scheme is linked directly to road usage so any attempt to grab revenue for more general use should be resisted.

3.2.6 Charges should be at a sensible and appropriate level.

3.2.7 Enforcement should be realistic enough to deter would-be non-payers and with sensible operational costs. We should have a compliance strategy on this, of which enforcement is just one aspect. This is especially the case for GNSS-based schemes where ‘hard’ enforcement is very difficult in many instances as the evidence is ambiguous. GPS jammers must be detected and fined heavily. Enforcement should be multi-faceted, based around a combination of detection by automatic number plate recognition (ANPR), and analysis of the charging data and other data (e.g. MOT mileage as a useful crosscheck, noting however that odometers are notoriously easy to fiddle, and in any case vehicles may travel abroad, which is not subject to the charge)

3.2.8 The system could offer the facility to vary the charge based on any combination of:

- Distance driven
- Vehicle characteristics (type, emissions, weight, axles etc)
- Time of day / day of the week / time of the year
- Road segment

3.2.9 Digital information on such schemes must be provided in JSON, not by hard copy Scheme Orders, so they can be easily integrated into information and enforcement systems and digital maps.

3.2.10 There are a number of alternative technologies that could be used for vehicles to report the distance they have travelled for distance based all-vehicle road user charging. The main candidates are:

- **Smart phones** – almost all are GPS equipped, and have a communications ability, so running a tolling app could be a solution. There are a number of obvious issues (running out of charge, leaving it at home etc.), but there are ways to mitigate these with improving technology and appropriate operational processes. This is likely to be the best candidate technology in the short term for most users.
- **Connected vehicles** – most recent vehicles have a built-in GPS and mobile communications, and manufacturers are increasingly bringing back data from their vehicles to their own systems. With the permission of the driver, road user charging data could be passed to an organisation calculating a charge. This is likely to be the best candidate technology in the long term, and overcomes many of the issues with smartphones.

- **On-board diagnostics (OBD) dongle** – all modern vehicle have an port (connector) used for mechanics to download diagnostics. Some devices plugged into this port can report the vehicle’s position. There are some issues with this solution in terms of making the connection, and manufacturers are increasingly wary of providing data in this way. However, the OBD2 dongle may already be present, provided for fleet management or pay as you go insurance (PAYGI) purposes, or could be provided as a road pricing OBU. It does not need to communicate with the vehicle as strictly only needs power from it . Trakm8 make a dongle that does not have any OBD2 data pins at all – it is simply better as a device than a smartphone.
- **Simple dedicated OBU** – the type of on-board unit used in truck tolling also has a short-range communications facility (DSRC) to facilitate enforcement of the charge. There are alternative ways of enforcing the charge, and so a low-cost version of the truck OBUs, without this DSRC capability, may provide a solution for those vehicles or drivers where the above solutions are not appropriate for whatever reason. A foreign vehicle, especially a truck, is likely to have an EETS compliant OBU already.
- **Fleet management systems** –most commercial fleets already fit their fleets of vehicles with tracking devices, and have software to help them manage their vehicle fleet from location data. This data can be used for road user charging, as has been shown in Hungary (see <https://www.hu-go.hu>) and Bulgaria (see <https://tollpass.bg/en/toll/toll-system-in-bulgaria>). This solution is mostly applicable to trucks and other commercial vehicles but the same technology is also used for pay as you go insurance and security in all vehicle types.

3.2.11 There are technological solutions for motorcycles if required.

3,2,12 Tolling and charging experts must be involved at every step of scheme design. If left to generalist civil servants or consultants, the outcome will not be of good quality. There are many systems available “off the shelf” around the world at this point, particularly as a result of the widespread adoption of different forms of road pricing for HGVs, so there is no need for high risk technology innovation as long as experts with thorough knowledge of most of these schemes are consulted during the design and procurement processes.

3.2.13 Do not expect to get 99.99% revenue accuracy. Fuel pumps collecting fuel duty are 99.5% accurate.

3.3 The level of public support for road pricing and how the views of the public need to be considered in the development of any road pricing scheme

3.3.1 Road pricing is popularly not well regarded and is an easy subject to attack politically. Even when there are strong compelling arguments in support for a scheme it is easy to create enough suspicion and doubt around it to whip up feelings against it. Logic does not always seem to carry much weight in political discussions these days with sentiment having more influence than it should. Any UK Government that tries to implement road pricing needs to appreciate that it would be an easy issue for the Opposition party to pick up and champion, and needs to have an effective information and persuasion strategy in place.

3.3.2 However, indicators are that the very high level of public opposition to any form of road pricing of say, ten years ago, is weakening somewhat. Nevertheless, a very high degree of opposition is to be expected, including from groups using road pricing as a proxy for concerns about “big state”, high taxation, surveillance of citizens, the reality of climate change, and so on. So a cross-party consensus would be highly desirable. As stated above, the implementation is likely to span more than one parliamentary term.

3.3.3 The “Green Agenda” is becoming more prominent. Air quality is becoming a more political issue and the recent case of the death of a young girl in London being attributed to pollution appears to be the start of it being taken more seriously by the general public. Motorists are looking to vehicles with alternative fuels, but the uptake is not great in the UK due to many challenges, not least the lack of charging facilities and incentives. The “Green agenda” should become more prominent nationally and the public needs to agree that a move to more environmentally friendly vehicles is possible, achievable and economically viable without any loss to essential mobility, practicality and finance. In terms of road user charging, we need to balance the contribution of zero and low emission vehicles to air quality with their contribution to congestion and, if we design road pricing badly, a continuing fiscal black hole.

3.3.4 If road pricing is put in place to plug the gap in the Government’s budget from the loss of revenue from petrol sales, then the costs to motorists of any new scheme will need to be explained clearly to the public who already think that they pay enough through taxes and the purchase of fuel. Any programme of information about this will face the problems from misinformation that we see around the world today. If it becomes a polarised issue then it will prove to be difficult to move forward

3.3.5 Any road pricing scheme should also be fair for all users, both those with UK registered vehicles and vehicles coming from outside the UK.

3.3.6 Social equity must also be a key concern. Vehicle excise duty is already extremely regressive, hitting the poorest hardest, who may have the fewest alternative options. Adding road pricing for those who must arrive at work at a fixed time while professional people who can work from home pay nothing, can add to this unless the scheme is designed with awareness of issues of equity. See for example the Stockholm scheme where public transport was significantly improved before even the trial phase of the congestion tax.

3.3.7 We also need to consider rural users where there often is no alternative, even at a considerable stretch of subsidy and advocacy for active travel, to travelling by private car or motorbike.

3.3.8 Vehicles run as a hobby, such as classic cars, and motorbikes which contribute little to congestion and road surface wear, will also need to be considered to avoid creating unnecessary opposition.

3.3.9 There are advocates for offering an optional flat rate charge and making participation in the tracking scheme optional, to address fears about privacy. We advise against this – the short term gain in public acceptance will be more than offset by the fact that all very high mileage drivers will take this option while it is with this segment of road users one would want to achieve the greatest change in behaviour.

3.3.10 Privacy will be a big issue with any distance-based charging system, although many people use this as a morally higher proxy for their desire not to pay. Points to consider are:

- People seem more concerned about Governments tracking their movements than private companies. For example mobile phone companies and banks have a lot of information on movements, but the public generally is relaxed about this. This can be accommodated by having the toll calculated by private service providers, who have the contract with the road user, gather the positional data and calculate the toll, which is charged to the road user, and sent on the road authority. In fact in mainland Europe this arrangement is fast becoming the norm, as it is envisaged in the European Electronic Toll Service (EETS) Directive 2019.
- There will inevitably be stories and rumours about dual use of the data for other purposes, e.g. speed enforcement, police etc. These must be pre-empted and countered by well planned and executed communications strategies. The Smart Motorways issues with public acceptance where facts about operational safety are simply not getting through or being accepted could serve as a warning example.

3.3.11 The biggest lesson is that we need to engage with the public and point out the intrinsic fairness of such a move, and how much worse the alternatives are.

3.4 The lessons to be learned from other countries which are seeking to decarbonise road transport and/or utilise forms of road pricing

3.4.1 Many other countries in mainland Europe are already charging trucks on a ‘pay-as-you drive’ distance based toll. This includes **Germany, Belgium, Czech Republic, Slovakia, Switzerland, Hungary, Bulgaria and Russia**. The **Netherlands** plan to implement such a system in the next few years (see <https://www.vrachtwagenheffing.nl/>)

3.4.2 These systems usually use dedicated GPS enabled on-board units. Such systems are usually termed ‘global navigation by satellite system’ or GNSS. These work well for trucks, but the cost of these dedicated on-board units is high and not recommended for a universal charging scheme. Lower cost versions of these OBUs may be an option.

3.4.3 Several European governments have commissioned reports into the feasibility of introducing a distance based road user charge for all vehicles as a way of filling in the fiscal shortfall, most notably the **Belgian and Dutch** Governments. For the Dutch example, see https://www.tweedekamer.nl/kamerstukken/brieven_regering/detail?id=2020Z25390&did=2020D53298 (see the technical appendix *bijlagen*). The project is called ‘Betalen Naar Gebruik’ (payment by use), and is destined to be a topic of discussion in the present election campaign in the Netherlands. This is not the first time the Netherlands has proposed such a scheme, with the ‘Anders Betalen Voor Mobiliteit’ (alternative payment for mobility) project back in 2008, which was discontinued after the government fell in 2010.

3.4.4 A number of the European GNSS-based truck toll schemes vary the tariffs depending on the EURO class with cleaner vehicles paying less. A good example is **Germany**. See https://www.toll-collect.de/en/toll_collect/bezahlen/maut_tarife/maut_tarife.html

3.4.5 The two congestion charging schemes in **Sweden** were introduced specifically to reduce the level of pollution in the cities. The main lessons learnt here is that the charge is a tool to move people from private vehicles to public transport, or indeed lead them to not travel at all. The variable tariff scheme supports the spreading out of the times people enter the cities which reduces the level of congestion and consequently reduces the level of pollutants. London too supported the uptake of public transport and cycling.

3.4.6 Freeflow schemes, common abroad and with the Dartford Crossing as a good UK example, support better air quality compared to those with barriers which create bottlenecks, and should be favoured where possible.

3.4.7 Road pricing can be used in its simplest form as a means for raising revenue, as we see in **Norway** where roads, tunnels, bridges are financed by electronic toll collection. Vehicles pay to pass a toll station. There is a simple tariff scheme with which users are charged the same price (only 2 tariffs for light and heavy vehicles) irrespective of the time of the passage. Norway until recently allowed electric vehicles to not pay the toll although this is now not the case. It was one of the incentives introduced to help the uptake of electric vehicles. This is a demonstration of where multiple objectives (improved air quality vs revenue raising vs congestion) can come up against each other.

3.4.8 Similarly, the inclusion of taxis in the vehicles which have to pay in **Stockholm** has also been controversial, but justified on the basis of their equivalent contribution to congestion.

3.4.9 **Slovenia** introduced a national truck tolling scheme that went live in April 2019. This scheme was subject to tests by a national Slovenia research organisation and it was proven that air quality had improved since the introduction of the truck tolling scheme. The technology is probably not applicable for the UK (DSRC for charging, DSRC/ANPR/AVC for enforcement) but the results are interesting.

3.4.10 **Singapore** trialled real time variable pricing on part of their congestion charge zone in 2006-2007. Currently tolls are adjusted every three months. Tolls are paid on passing a gantry with on-board-unit.

3.4.11 There are several pilot schemes in the **USA** trialling distance-based charging for all vehicles as an alternative to gas tax. This includes trials in Oregon and California.

3.4.12 **France's** Lorry Road User Charge (Ecotaxe) was conceived in 2007 during the Grenelle de l'Environnement. This environmental tax (Ecotaxe) was voted through unanimously in 2009, the objective being to reduce road use by HGVs (Heavy Goods Vehicles), perceived as polluting and energy-intensive, and to finance the development of river or rail transport. The objective of this Ecotaxe was to reduce greenhouse gas (GHG) emissions by reducing road traffic by taxing the kilometres travelled by HGVs.

By taxing 800,000 HGVs on the non-tolled network, the French State hoped to raise enough money to finance public transport, rail freight etc.

The tax applied to freight vehicles that travel on the taxable network regardless of the content transported, this has the effect of encouraging hauliers to rationalise their journeys and limit unloaded carriers. Hauliers in the prices charged to their customers could pass on the amount

of the HGV Ecotaxe in full. However, this entailed significant administrative work for the carrier, as a trip may not be assigned to a single customer.

Ecotaxe was only to be applied on national roads, on certain departmental roads and on non-tolled motorways, i.e. a small part of the motorway network.

The project was amended to become a system that was revised downwards, reducing the network of taxed roads from 15,000 kilometres to 4,000 kilometres and renamed "HGV transit toll".

Ultimately due to public opposition the Ecotaxe was abandoned in October 2014.

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