Electromobility and Road Safety

making Zero-Carbon support Vision-Zero

Policy Brief – June 2024

This project has received funding from the European Union Horizon 2020 research and innovation Programme under grant agreement no. 875041

PROJECT PARTNERS

ABOUT

This report has been prepared for the project SOLUTIONSplus. The project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement no. 875041

TITLE

Electromobility and Road Safety making Zero-Carbon support Vision-Zero

AUTHORS

Pedro Homem de Gouveia, *Senior Policy Advisor and Cluster Lead for Safety & Security and for Governance & Integration, POLIS*
Pedro Gomes, *Cluster Lead Clean Vehicles & Air Quality, POLIS*
Cover photo credits: Photo by Precious Madubuikeon Unsplash

DISCLAIMER

June, 2024

CONTENTS

INTRODUCTION

Decarbonisation[1] of Road Transport is becoming a political priority for national, regional, and local governments worldwide.

As an essential tool to reach that goal, Electromobility[2] is advancing fast – public incentives and market dynamics are increasing the number of vehicles, expanding the infrastructure to charge them, and overcoming a decades-old bias favouring the use of fossil fuels.

However, reducing vehicle CO2 emissions is not enough – Road Transport must also become safe. Road deaths and serious injuries are not an 'accident', but the result of systemic problems which can be overcome – as such, road deaths and injuries are preventable, and eliminating them is an ethical imperative.

This one of the basic tenets of Vision Zero[3], a very effective approach to Road Safety which is leading to a more ambitious political commitment in this domain and which raises the bar for Electromobility: it should be cleaner but also safer.

This Policy Brief explores six key issues where Electromobility brings new challenges and opportunities for Road Safety: (1) speed and acceleration, (2) noise, (3) size and weight, (4) charging infrastructure in the street, (5) diversity of vehicles, and (6) fire safety.

How can local and regional governments best mitigate the risks and benefit from the advantages? This Policy Brief aims to inform and support cooperation among professionals working on different challenges and foster a more holistic and integrated approach. In short – **how can we make Zero-Carbon support Vision-Zero?**

[1] "Decarbonisation" can be defined as the reduction or elimination of carbon dioxide emissions from a process; in this case, that process is the transportation of people and goods.
[2] "Electromobility" can be defined as the use of an electric powertrain for the transportation of people and goods.
[3] Vision Zero is an ethical stance stating that it is not acceptable for human mistakes to have fatal consequences. It can be viewed as a paradigm shift, where the ultimate responsibility for road safety is shifted from the individual road-user to those who design the transport system, for example, road management bodies, vehicle manufacturers, legislators, commercial transport operators, the police authority and others. The responsibility of the road-user is to comply with laws and regulations (https://www.roadsafetysweden.com/about-the-conference/vision-zero---no-fatalities-or-serious-injuries-through-road-accidents/).

METHOD

This Policy Brief was developed with extensive input from transport professionals and other specialists working at the national, regional and local levels.

Input was collected through (1) the POLIS[4] working groups for Air Quality & Clean Vehicles and for Safety and Security, (2) a workshop held at a meeting of the International Transport Forum's Safer City Streets Network[5] and (3) several interviews with specialists.

Work was conducted through the EU-funded Project SOLUTIONSplus[6], which aims to bring knowledge on Electromobility to the world's four corners.

[4] POLIS is the leading network of European cities and regions advancing sustainable mobility through transport innovation (www.polisnetwork.eu).
[5] Meeting in Guadalajara, October 2022.
[6] www.solutionsplus.eu

WHY IS ELECTROMOBILITY SO IMPORTANT?

Climate change is not something that will only ‘happen in the future’. It is already here, affecting us through, for example, heat waves, droughts, and flooding.

Global warming is making these and other extreme weather phenomena become more intense, and more frequent. Their multiple direct and indirect impacts pose a growing threat to our communities' safety, health and cohesion.

Some gases in our atmosphere – such as carbon dioxide (CO_2), methane and nitrous oxide – act like an insulation blanket for the Earth. They warm the Earth by making it harder for heat to be released into outer space, just like the walls of a greenhouse help keep the air inside warmer than its surroundings. This effect is called the greenhouse effect, and these heat-trapping gases are called greenhouse gases (GHG).

The greenhouse effect is a natural process that makes the Earth liveable for humans: without this, the global average temperature would be about 33 °C colder[7]. However, human activities since the 19th century have emitted more and more GHG into the atmosphere, mostly from burning fossil fuels (coal, oil and gas), but also from agriculture and forestry. These actions add to the natural greenhouse effect, causing global warming.

The transport sector accounts for around one-fifth of global CO_2 emissions. Road transport accounts for three-quarters of those. Most road transport emissions come from passenger vehicles (cars and buses, contributing 45.1%), and from trucks carrying freight (29.4%).[8]

Decarbonising road transport is therefore a critical step in tackling the Climate Crisis, and an indispensable measure to comply with the binding compromise established by the Paris Agreement to limit global warming to 1.5 °C compared to pre-industrial levels.

Electric vehicles (EV) have a vital part to play in this process.

Contrary to internal combustion engine (ICE) vehicles, they do not burn fossil fuels, and thus have zero tailpipe emissions of pollutants and GHG.

This is not, however, the only difference between EVs and ICEs.

Another key difference is simplicity – while an ICE powertrain[9] involves more than 2,000 moving parts, an EV powertrain can have around 100 times fewer moving parts, which makes it much simpler and cheaper to produce, operate and maintain.

The EV has an electric motor supported by a controller and a DC/AC inverter. The motor is powered by a battery pack, which acts as an electrical storage system.

[7] IPCC, “Climate Change 2021: Summary for All”. Retrieved from https://www.ipcc.ch/report/ar6/wg1/downloads/outreach/IPCC_AR6_WGI_SummaryForAll.pdf
[8] Hannah Ritchie (2020), “Cars, planes, trains: where do CO_2 emissions from transport come from?” Published online at OurWorldInData.org. Retrieved from: https://ourworldindata.org/co2-emissions-from-transport
[9] The “powertrain” is the system designed to propel the vehicle forward. In a car, a powertrain consists of the engine or motor and its internal components, such as the energy storage system, transmission and driveshaft.

These batteries are recharged via a charge port, which connects the vehicle to an external electricity supply.

The current price of the batteries and the resources needed to manufacture them are a big hurdle when it comes to EV affordability, but they are becoming cheaper and more efficient over time.

One of the major challenges for the mass adoption of EVs is the availability of suitable charging infrastructure for the vehicles to avoid range anxiety from drivers, i.e., a fear that the vehicle does not have sufficient battery capacity to reach its intended destination and may leave the driver stranded.

To overcome this challenge, public authorities at various scales (local, regional, national and European) are working together to increase the deployment of a comprehensive charging infrastructure which can keep up with the increased number of EVs on our roads. In the European Union, for example, the Alternative Fuels Infrastructure Regulation (AFIR) is expected to lead to massive growth of public charging networks, and the Energy Performance of Buildings Directive (EPBD) will stimulate the installation of EV charging infrastructure in the parking garages of residences, offices and other buildings.

There are legitimate concerns that the accelerated uptake of EVs might put the electricity grid under pressure, impacting its capacity to provide safe, secure, and stable energy for these vehicles. Technological developments may help avoid this problem. Two innovative solutions are particularly interesting:

- Smart charging paired with renewable energy production, which allows for dynamic charging and pricing (this will discourage users from charging when demand is higher);

- Bidirectional charging enables the vehicle to not only receive electricity, but also to store it and insert it back into the grid (vehicles can thus become “batteries on wheels” which can balance energy demand and load capacity during peak hours).

So, are EVs the ‘magical solution’ for our transportation problems? Certainly not. Electromobility alone cannot, and will not, fix all the environmental impacts of road transport.

Firstly, because although EVs can significantly reduce urban air pollution, noise, and GHG emissions, they still cause pollution due to abrasion (both tyre friction on the road surface and brake friction release micro-particles that pose a health hazard).
Secondly, because the environmental impact of EVs strongly depends on the energy mix – in other words, on how the electricity that moves the EVs is produced in the first place. If it is through fossil fuels (coal, natural gas, petroleum), the emissions of CO_2 will simply be moved from the vehicle’s tailpipe to the power plant’s chimney.

Finally, because electric cars fundamentally remain cars – and as such cannot solve the problems of traffic congestion, abusive use of public space, urban noise, and road danger.

E-FAST?

Electric cars can travel at high speeds too. They can actually reach those speeds quicker, as they have instant torque and accelerate faster.

- Speed is the most significant factor in road crashes – higher speeds increase the probability and the severity of crashes. Reducing the speed of motorised traffic is an indispensable step towards improving Road Safety.

- Experience clearly shows (and research clearly explains) that appealing to individual responsibility alone is not effective. Road danger has underlying structural causes, and addressing them is critical.

- The infrastructure and the vehicle have key roles to play. The infrastructure (streets and roads) has to be shaped and managed in a way that automatically leads drivers to reduce their speeds. This is what traffic calming is doing very successfully.

- Vehicles can also be equipped with automatic speed control so as not to allow the driver to go beyond the legal speed limits. This has been, however, a matter of contention for several decades[10], with the automotive industry not only resisting such limitations but, even worse, using speed and acceleration as key marketing arguments.

Will Electric Vehicles (EVs) extend this problem or help overcome it?

- The EV revolution is helping deliver a new golden age of automotive horsepower.[11] Like ICE vehicles, EVs can travel at high speeds, too, and they can reach those speeds faster, as they have instant torque and don't require going through successive gear shifts.[12]

- There are differences in how the driver can perceive the vehicle's acceleration and speed, as an electric motor's acceleration and cruising speed produce very little and quite different sounds and vibrations when compared to an ICE. Awareness of speed may be severely impaired with EVs, encouraging higher speeds.

- This combination of fast acceleration and impaired speed awareness raises the risk of crashes, and that risk is bound to be higher with less experienced drivers[13], affecting vehicle occupants and all other road users (in particular, people walking and cycling).

- This problem does not only affect cars – electric motorcycles also have extremely high acceleration rates and are becoming more numerous. They have, in addition, all the other risk factors of motorcycles.

- We must reduce speed limits to safe levels and ensure motorised vehicles comply with those limits. This must be done, first of all, through vehicle on-board technology and mechanical solutions for that have been available since the dawn of the motor car.

[10] Peter D. Norton (2011), "Fighting Traffic: the dawn of the Motor Age in the American City", The MIT Press.
[11] https://www.bloomberg.com/news/features/2023-01-06/welcome-to-the-age-of-extreme-acceleration
[12] https://www.caranddriver.com/features/a38887851/why-are-evs-so-quick/
[13] https://www.newsweek.com/electric-vehicles-may-too-hazardous-teen-drivers-1808156

- Recent developments have made automatic speed limitations easier, particularly the adjustment to different speed limits in different parts of the road network. Global Positioning Systems (GPS) and Internet of Things[14] technology, for example, have made Geofencing[15] a practical and effective solution.

- Shared Micromobility (the sharing of small vehicles, particularly electric standing scooters and bikes) has been one of the major adopters of geofencing technology. Private operators and public regulators have been using it to implement rules on areas of operation, parking… and speed limits.

- The effectiveness geofencing has had in the regulation of Shared Micromobility begs the question: when will we start using it to regulate other mobility services and transport modes?

- Intelligent Speed Assistance (ISA) is another tool to foster compliance with legal speed limits. In its General Safety Regulations (GSR)[16], the European Union has defined ISA as *"a system to aid the driver in maintaining the appropriate speed for the road environment by providing dedicated and appropriate feedback"*.[17]

- This means that, with ISA, compliance with the speed limit is not automatic: the system provides a warning, and the decision fully remains with the driver. This is, obviously, less effective than automatic speed limitation – even more so because the GSR explicitly requires that the driver be able to *"switch off the system"* and to exceed *"the system's prompted vehicle speed"* (i.e., the legal speed limit).[18]

- In the current situation, speed limitation technology is, by far, less effective on the main source of road risk (the heavier and faster cars, vans and trucks), than on some of the most vulnerable (shared bicycles and standing scooters).

- Electromobility is going to power Autonomous Vehicles (AV). This holds a promise for effective speed control, as companies operating the AVs may be made directly liable for non-compliance with those limits.

- Electromobility is advancing at the same time as new speed control technology. Today, we have the power to combine them and eradicate road deaths and serious injuries.

[14] We can define "Internet of Things" as the interconnection via the internet of computing devices embedded in everyday objects, enabling them to send and receive data.

[15] We can define "geofencing" as the use of GPS (global positioning systems) or RFID (radio frequency identification) technology to create a virtual geographic boundary, enabling software to trigger a response when a mobile device enters or leaves a particular area.

[16] Regulation 2019/2144 of the European Parliament and European Council on type-approval requirements for motor vehicles and their trailers, and systems, components and separate technical units intended for such vehicles, as regards their general safety and the protection of vehicle occupants and vulnerable road users.

[17] How does the system detect the speed limit? For GSR, through the observation of road signs and signals, based on infrastructure signals or electronic map data, or both.

[18] Cf. GSR, article 6, number 2, paragraphs b) and d).

E-SILENT?

The noise made by internal combustion engines was used by people with visual disabilities to detect motorised vehicles. Electric engines are silent, and bring an additional challenge to crosswalks and shared spaces.

- Noise caused by transport can lead to several negative health impacts, from stress and heart disease to mental health problems and learning difficulties in children. In some cities, these negative health impacts can be as strong as the impacts of air pollution.

- There is a strong equity dimension in how this affects public health. Less privileged households tend to be exposed to a higher level of noise, and tend to have more difficulty shielding themselves from noise due to unfavourable housing conditions.[19]

- The circulation of a car emits noise in more than one way. The key sources are the operation of the engine, the friction of the tyres and the dislocation of air. Other sources can add up sporadically (horn, car occupants, etc.), but for the purpose of this document, focus will be on the three key sources.

- With cars and larger motorised vehicles, be they ICEs or EVs, the levels of noise emitted by the friction of tyres and the dislocation of air tend to grow with speed – in general, the faster the vehicle rolls, the noisier it gets. This means that, at higher speeds, the lack of noise will not be much of a problem – the speed will.

- The difference between ICEs and EVs lies in the engine – the noise generated by an ICE comes from fuel combustion and the vibration and air pressure waves it generates.[20] The operation of the electric engine involves no combustion.

- This means that, at low speeds, when air dislocation and tyre friction tend to emit much less noise, EVs are almost silent. This makes them hard to detect for blind and partially sighted pedestrians, who require acoustic input to be aware of crossing vehicles.[21]

- As a growing number of local authorities implement lower speed limits, particularly through 'blanket' speed reductions in wide areas, the circulation of 'silent' electric cars in urban areas will become more frequent, and so will this concern.

- This difficulty in detecting EVs applies to both larger vehicles, e.g., electric cars, and to smaller vehicles, e.g., electric bicycles. The rapid proliferation of electric standing scooters (also called e-scooters) in city streets raises specific concerns. When users fear motorised traffic, they may ride them on the sidewalks, conflicting with people walking.

[19] Peter Preisendörfer, et. al., "Pathways to Environmental Inequality: How Urban Traffic Noise Annoyance Varies across Socioeconomic Subgroups", International Journal of Environmental Research and Public Health, 2022 Nov; 19(22): 14984 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9690593/)
[20] Cf. for example Ann P. Dowing et. al., "Combustion noise", Proceedings of the Combustion Institute, Volume 35, Issue 1, Pages 65-100 (https://www.sciencedirect.com/science/article/pii/S1540748914004003)
[21] European Blind Union (EBU), (no date), "Silent cars and AVAS – questions and answers", accessed July 2024 (https://www.euroblind.org/silent-cars-and-avas-questions-and-answers)

The reduction of traffic noise is a very positive outcome of Electromobility and will benefit quality of life. But silent vehicles raise challenges – how can we deal with them?

- Before hastily adopting potential solutions, authorities should start by pondering if something actually has to be done. Firstly, as explained above, EVs are silent at low speeds, and lower speeds mean lower risk. Secondly, the most immediate solution, the generation of noise, may have negative public health effects.

- We should also ponder what, specifically, is the new problem posed by the silence of electric engines that requires 'fixing' (in both ICEs and EVs, the driver can sound the horn or ring the bell to alert others, so that is not the issue). Alerting the driver to the presence of other road users is not the issue here, either.

- A person who is managing traffic on foot or on a bike needs to sense and detect the presence and direction of movement of surrounding vehicles. For those with limited vision, either due to disability (e.g., blind or partially sighted persons), position (e.g., cyclists approached by the back) or context (e.g., walking in a dark environment), the provision of sound is important.

- Generating continuous noise to make other road users aware of the approach of EVs can be done through the surface of the road, as texture increases the 'rumble' of the tyres, or through noise emitted as a 'stand-in' for engine noise.

- The latter is now law, at least in the European Union, where regulations[22] mandate that all new types of electric and hybrid cars must be fitted with an "acoustic vehicle alerting system" (AVAS). The device will automatically generate a sound from the start of the car up to the speed of approximately 20 km/h, and during reversing.

- This raises new practical issues. What is the appropriate kind of noise, considering human sensory capabilities and psychological susceptibility? Should the system ensure adjustment to contextual noise? Should the sound change according to the size and weight of the vehicles? Should authorities define a standard sound to ensure people can easily recognise it?

- As vehicle manufacturers create sounds to meet these regulations, branding seems to be a concern, with some of them reportedly resorting to musical artists to create unique 'designer sounds'.[23] In some cases, this proliferation could be cause for concern.[24]

- Technology may enable new solutions, but as we search for them and research them, some ethical and safety principles must be kept in mind. May we suggest three:

[22] Cf. European Commission's Delegated Regulation (EU) 2017/1576 (https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX%3A32017R1576)
[23] Source: 2023 interview by the authors to Professor Nick Tyler, Director of the Person-Environment-Activity Research Laboratory (PEARL), University College London.
[24] Cf. for example, "What's red and sounds like £400,000? An electric Ferrari – once you add fake engine noises", *in* The Guardian, 23/01/2024 (https://www.theguardian.com/lifeandstyle/2023/jan/25/whats-red-and-sounds-like-400000-an-electric-ferrari-once-you-add-fake-engine-noises)

(1) The risks generated by the vehicle must be dealt with, first and foremost, at the source, i.e., on the vehicle – for example, it is never acceptable to lay on those outside the vehicle (namely people walking or cycling) any duty or responsibility for wearing devices that can communicate with the vehicle, for the same reason that they cannot be blamed for not using high-visibility clothing at night.

(2) The use of technological solutions must not create disparities between road users nor wrong expectations, especially on the part of drivers. Not everyone can access technology, much less at the same time. Vehicle type-approval regulations only apply to new vehicles, and thus their impact fully depends on the speed of fleet turnover.

(3) To err is human. As a product of humans, technical solutions are also bound to fail and should never be the only safety measure. Furthermore, sound is not an effective panacea for the danger created by heavy vehicles travelling at high speeds. The key problem remains speed – ICE cars are noisy, and that doesn't make them any safer.

E-LARGE?

With an ICE, bigger cars emit more greenhouse gases. Manufacturers have kept size and weight in check to comply with emission limits and tax regulations, but EVs do not need this 'diet'. And bigger cars are deadlier.

- Moving larger and heavier cars consumes more energy. ICEs get more energy by burning more petrol-based fuels, and thus emitting more greenhouse gases (GHG). With EVs it is different – they do consume more energy, but because they do not burn anything in the process, that makes no difference to their tailpipe GHG emissions.

- In Europe, EU regulations for the type approval of cars have established emission limits, and pushed for their progressive reduction. To meet those limits, car manufacturers improved exhaust filters, increased the efficiency of engines, and kept weight in check. 'Weight control' was no longer needed to meet regulatory emission limits, as the more stringent Euro 7 levels apply to all cars, irrespective of size.

- However, engine power and vehicle size still influence fuel consumption and therefore CO_2 emissions of ICE cars. With Electromobility, zero CO_2 tailpipe emissions, coupled with a general trend in marketing pushing for bigger[25] and more expensive cars[26] to appeal to the higher-end consumers who can afford EVs.

- This combination is driving the fast growth of electric plug-in sports utility vehicles (SUV), bigger and heavier vehicles which pose serious risks because of their (1) weight, (2) size, (3) impact on the infrastructure, and (4) design.

- Heavier cars strike harder – as stated by Newton's 2nd law of motion, force equals mass times acceleration. No wonder that, according to a study by Vias Institute[27], across the entire Belgian car fleet, an increase of 60 kW power or 135 kg weight increases pedestrian death risk by 10%, and for an increase of 575 kg, this risk rose by 50%. These concerns are also being raised in the USA.[28]

- Bigger cars have a negative effect on visibility. The higher position of the driver's seat and the higher and bigger bonnet of the vehicles can obstruct the driver's view of lower elements near the vehicle, namely children and persons using wheelchairs. Bigger cars also reduce the visibility for other road users, whether they're parked or rolling, obstructing the view of e.g. pedestrians crossing the street or cars approaching the pedestrian crosswalk.

- Increase in the weight and size of cars also has negative safety impacts on the infrastructure. In vertical parking lots, the growing number of heavier vehicles may exceed the load capacity for which these structures were designed, leading them to collapse.[29] Bigger vehicles are also a problem for on-street

[25] https://www.transportenvironment.org/articles/cars-are-getting-1-cm-wider-every-two-years-research
[26] https://alternative-fuels-observatory.ec.europa.eu/policymakers-and-public-authorities/electric-vehicle-model-statistics
[27] https://www.vias.be/nl/newsroom/hoe-zwaarder-de-auto-hoe-meer-kans-op-overlijden-voor-de-kwetsbare-weggebruikers/
[28] https://www.reuters.com/business/autos-transportation/us-ntsb-chair-raises-safety-concerns-about-heavy-electric-vehicles-2023-01-11/
[29] Cf. for example "As EV sales surge and cars get heavier, parking garages will have to change", in CNBC October

parking, as they do not fit standard parking spaces or are much harder to fit properly – and their 'overflow' onto the carriageway harms traffic flow (particularly of public transport, e.g., blocking trams) and road safety.

- The design of electric SUVs is also raising major road safety problems, particularly their higher and more vertical front end. Research[30] shows that pickup trucks, SUVs and vans with a hood height greater than 40 inches (approx. 101 cm) are about 45 per cent more likely to cause fatalities in pedestrian crashes than cars and other vehicles with a hood height of 30 inches or less (approx. 76 cm) and a sloping profile – instead of being projected onto the car's bonnet, pedestrians can be dragged under the car – which is quite ironic, because in EVs the design of the car's front is no longer constrained by the size and shape of the combustion engine…

- There is an equity dimension here, too, which must be considered – the buyers of electric SUVs are being 'promised' a safer vehicle when the vehicle they purchase is, in fact, raising the risk for all other road users, cars included. In a collision, the occupants of lighter vehicles will suffer higher forces.[31]

- Manufacturers argue that EVs need to be bigger to carry larger batteries that can assuage driver's "range anxiety". But do we really need all this weight for our daily commute? And are the vehicles ready for it? It's not clear that all EVs have braking performance that matches their additional mass – and thus, extra weight may lead to longer stopping distances, leading, in turn, to higher fatality rates.[32]

It must be emphasised that electric passenger cars do not need to be bigger and heavier, particularly those used in urbanised areas (urban, suburban and peri-urban areas), where trips are shorter on average and access to charging points is easier. The preference for bigger and heavier EVs essentially results from a marketing choice, not from consumer demand (in our modern economy, it is the role of marketing to shape consumer demand). And this choice actually undermines the benefits of Electromobility:

- Larger and heavier cars spend more energy than smaller and lighter cars – they have to move more weight and overcome more aerodynamic drag. Lower energy efficiency seriously reduces their environmental benefit.

- Larger and heavier cars also produce more pollutant emissions from road and tyre abrasion. This is admitted by the EU, as Commissioner Thierry Breton highlighted recently.[33] And scientists are increasingly concerned[34] by the health impact of air pollution produced by the wear of vehicle tyres, which will become more and more significant compared with exhaust emissions. The particles are especially damaging due to the toxic chemicals they are made from.

2023 (https://www.cnbc.com/2023/10/03/as-ev-sales-surge-and-cars-get-heavier-parking-garages-have-to-change.html)

[30] Cf. for example Insurance Institute for Highway Safety (2023), "Vehicles with higher, more vertical front ends pose greater risk to pedestrians" (https://www.iihs.org/news/detail/vehicles-with-higher-more-vertical-front-ends-pose-greater-risk-to-pedestrians)

[31] Cf. for example Raul Arbelaez (2023), "As heavy EVs proliferate, their weight may be a drag on safety", Insurance Institute for Highway Safety (https://www.iihs.org/news/detail/as-heavy-evs-proliferate-their-weight-may-be-a-drag-on-safety)

[32] Ibidem.

[33] https://www.politico.eu/newsletter/brussels-playbook/breton-wants-to-save-das-auto-carbon-levy-mellow-meloni/

[34] https://amp-theguardian-com.cdn.ampproject.org/c/s/amp.theguardian.com/environment/2023/feb/23/health-impact-tyre-particles-increasing-concern-air-pollution

This issue also goes beyond passenger cars:

- Electric trucks, buses, waste collection vehicles and other heavy-duty vehicles (HDV) are also bound to be heavier. All of them travel on roads also used by pedestrians and cyclists, users who are particularly vulnerable to the HDV's 'blind spots', i.e., the areas that the driver cannot see while driving (usually the front, back and sides of the HDV).

- Larger electric cargo bikes can also raise the risk of collision in bike lanes that are not prepared in terms of width and carrying capacity.

Finally, in terms of action:

- A sustainable road transport ecosystem needs vehicles of different shapes, weights, and sizes. However, strict functional necessity should be the reason for bigger and heavier vehicles, not consumer marketing.

- SUVs are an excellent example of what we do not need and should not have: vehicles that significantly raise road danger and reduce environmental benefits. Paris was one of the first European cities to act on this, and starting October 1st, 2024, it will triple the parking fee for SUVs of non-residents.[35]

- The concern of many cities, however, is that this problem must be addressed at a higher regulatory level (national and preferably European too); otherwise, there is not much they can do on their own – once the large cars are approved to be on the street, discriminating them is a tricky issue from a legal standpoint.

- Raising the awareness of regulators is a priority – they must be provided, e.g., with technical evidence like speed curves comprising different vehicle mass profiles vs. safe speeds. It might be useful, e.g., to establish caps for manufacturers on maximum speed depending on vehicle mass.

- We should also consider regulating vehicle weights on type approval, not just size and type classification, as this is relevant for safety and parking. Cities like Lyon are now establishing parking charges linked to car's weight[36], with others to follow.

[35] https://www.paris.fr/pages/plus-ou-moins-de-suv-les-parisiens-et-parisiennes-sont-invites-a-voter-le-4-fevrier-25381
[36] https://www.connexionfrance.com/article/French-news/French-first-as-city-brings-in-parking-charges-linked-to-car-s-weight

E-MESS?

Market uptake of electric cars is growing the demand for dedicated charging infrastructure. Its deployment must respect sidewalks, not cluttering them with charging stations (much less wires coming out of apartment windows…).

- ICEs store energy in a fuel deposit, and EVs store it in a battery. ICEs need to regularly stop at gas stations to fill up the fuel tank, EVs regularly need to connect to a recharging station to recharge their battery. So far, things look equivalent – but while ICE drivers can use a network of gas stations grown over the course of more than 120 years[37], EV drivers have to rely on a much younger (and limited) network of recharging points.

- The limitations imposed by the initial small number and limited spatial distribution of recharging stations are aggravated by the fact that, at low and medium-powered charging stations, it takes much more time to fully recharge the battery of an EV than to fill up the fuel tank of an ICE. This reduces the potential number of users, and also leads drivers to leave their cars parked for longer periods than strictly necessary (further reducing turnover).

- The public sector is strongly supporting the growth of the EV recharging network with subsidies, tax benefits, and, most importantly, the provision of public space for its deployment, particularly through the allocation of on-street parking spaces.

- Public authorities need to install recharging infrastructure in the public right-of-way. Of course, that is not the only space where it can be installed, but it is difficult to avoid it. So the question is how to do it correctly, and fundamentally, how to prevent negative impacts on the walking infrastructure (sidewalks, crosswalks and bus stops).

- Recharging stations for electric cars are composed, basically speaking, of three elements: (1) a charging unit, a 'block' which integrates several components, from the connection to the electrical grid to the user interface, (2) cables that connect the vehicle to the unit, and (3) a space to park the car while charging.

- If implemented incorrectly, any of these three elements can degrade the accessibility, safety and comfort of the walking infrastructure, so special care must be taken.

- Placing the charging unit on the sidewalk adds to the clutter already there (traffic signs, advertising panels, rubbish bins, restaurant terraces, etc.), and reduces the usable width, which may block the passage of persons with wheelchairs or strollers and make them walk on the carriageway. It will also lead to the placement of charging cables on or across the sidewalk, creating a tripping hazard. Finally, the parking space must be placed in a way that does not encourage partial overtaking of the sidewalk and does not obstruct the view of crosswalks and bus stops.

[37] In 1885, Sylvanus Freelove Bowser sold his newly invented kerosene pump to the owner of a grocery store in Fort Wayne, Indiana. Less than two decades later, in 1905, the first purposely built drive-in gasoline service station opened in Saint Louis, Missouri (https://aoghs.org/transportation/first-gas-pump-and-service-stations/ and https://www.heinzhistorycenter.org/blog/was-the-worlds-first-gas-station-in-pittsburgh-its-complicated/)

- A century of car-centric transport policies has led to a very unequal distribution of space in the public right-of-way, with most of it dedicated to the circulation and parking of motorised traffic, to the detriment of walking infrastructure.

- Electric recharging stations will serve motorised traffic and so must be deployed in the space already allocated to it instead of encroaching on the already limited space for walking. Where necessary, a possible way forward seems to be repurposing indispensable elements, such as street lamps[38], so as to avoid multiplying obstacles.

- The limited number and distribution of recharging stations is leading some EV owners to resort to 'home-grown' charging means, either inside their property (in their driveway or garage) or, literally, through their apartment windows – in the latter case leading to the sporadic proliferation of charging cables on sidewalks, particularly at night (thus aggravating the tripping hazard).

A growing charging market will encourage technological innovation (e.g., wireless charging is now possible) and design improvements, but the need for solutions ready to apply today is quite pressing. So is the need for data regarding distances travelled, travel patterns and charging requirements of EV users. This data is necessary to make informed decisions on EV charger deployment, but it can also help with Road Safety indicators, particularly by providing reliable exposure data.

[38] https://insideevs.com/news/619989/using-lamposts-for-ev-charging-reduces-carbon-footprint/

E-VARIOUS?

Electric engines are smaller, lighter, cheaper, and easier to manufacture and install. They're powering a growing number of bikes, cargo bikes, scooters, skates, and many more "vulnerable road users".

- Electric engines have a much smaller number of moving parts – while an ICE powertrain involves more than 2.000 moving parts, an EV powertrain can have around 20 moving parts. That's 100 times less.

- This simplicity makes it easier to manufacture smaller, lighter and cheaper electric engines, and to install them in all sorts of small vehicles. And so, we are witnessing a fast rise in the number and diversity of light electric vehicles – from bikes to cargo bikes, scooters to skates, and whatever will come next.

- These light electric vehicles (LEVs)[39] have become very popular in urban areas for short trips and first- and last-mile connections to public transport – and as cities improve their conditions for cycling, they will become even more popular.

- Shared micromobility companies have deployed large fleets of e-bikes, e-cargo bikes and e-scooters in several cities around the world, providing many people with a 'taste' of their potential. Research has highlighted that a key step for the adoption of innovations[40] is trial by the potential adopter, and many satisfied users have gone on to buy their own e-bikes and e-scooters.

- This is leading to a quick rise in the number of *individually-owned* LEVs. The case of France is revealing: in 2021, while the total number of e-scooters deployed by shared micromobility operators in all French cities stood below 40.000, over 908.000 units were sold to individuals. In the following year, an estimated total 2,5 million units were owned by individuals all across the country.[41]

- This is an important 'detail' from the regulatory point of view, as most rules devised by the public sector for e-scooters (from physical characteristics, e.g., size and shape, to operational performance, e.g., speed and parking controls) apply to *shared* e-scooters, through conditions imposed on their *shared micromobility operators*. Individually-owned e-scooters are not subject to the same level of regulation and enforcement.

- It is true that a good part of this phenomenon consists of the motorisation of previously existing types of vehicles, where pedal power is now complemented by a motor – see, for example, a bicycle turned e-bicycle. But one should bear in mind the full impact of this change and of the new safety challenges it raises – considering the power of the vehicle, its appeal to new users, and the

[39] For the Light Electric Vehicles Association EU (www.leva-eu.com), the concept "Light Electric Vehicles" includes *"a range of vehicles with one or more wheels that offer affordable, accessible, healthy and clean transport* [and which] *are included in the L-category or excluded through Article 2.2 of Regulation 168/2013."* The German Federal Ministry for Digital and Transport further considers a subgroup designated "Personal Light Electric Vehicles", to specify vehicles which are *"very small and lightweight, thus allowing for a foldable and portable design* [which] *enables the users to take the vehicles on public transport."*
There is no single definition and scope of "Light Electric Vehicles"

[40] Rogers, Everett (2003), "Diffusion of Innovations", 5th Edition, Simon and Schuster. Rogers' five stages for the adoption of innovation are: awareness, interest, evaluation, trial, and adoption.

[41] Source: Fédération des Professionnels de la Micro-Mobilité (March 2022)

expectations and competencies of those users.

- An electric bicycle is much more than its non-electric counterpart – it enables a user to roll faster, climb steeper streets, and cover longer distances. Cycling has been made easier, bringing in more users and enabling older users to keep riding. It is a positive development but it has inherent risks that must be managed.

- The fact that electric bicycles are *easier* to ride does not mean they are *safer*. Higher speeds raise the probability and the severity of crashes for cycling too – particularly the risk of single-vehicle crashes (e.g., falls due to cracks in the pavement), of crashes with other bikes (particularly in undersized bike lanes), and of crashes with people walking.

- Also, the fact that it is easier to put the vehicle in motion can mask the inexperience and lack of competence of the user to respond effectively to all subsequent functional needs, particularly to the needs posed by, e.g., circulation in urban traffic, intensely used cycling infrastructure, or poorly maintained pavements.

- If the electrification of bikes makes such a difference, what about the electrification of kick-scooters, or *trotinettes*, now called e-scooters? Contrary to their 'toy ancestors', they are now used by adults. Taller and heavier users increase the momentum of the force[42] if the front wheel gets stuck – the user is more likely to rotate with his head towards the ground for a stronger impact.

- E-scooters have several characteristics that raise risks for their users – the standing position makes it easier for the user to lose balance, and when combined with the vehicle's frontal configuration, it makes rotation easier (particularly because of the relation between the handle and the front wheel). Small frontal wheels, in turn, are much more sensitive to problems in the pavement (cracks, small bumps, etc.).

- But the key point here is not to discuss the design of the vehicle, which has not changed much throughout more than a century. The key point is to understand that electrification is making these and other small vehicles (skates, unicycles, monowheels, and more, as the list will keep expanding) available as motorised transport options and that they are being adopted by adults to travel widely.

- Beyond the vehicles, the new services that are using these vehicles must also be considered. The fast growth of e-commerce and digital consumer platforms is fuelling the fast growth of *instant platform deliveries*, i.e., the fast delivery of goods sold on digital platforms, usually by people who do not have a formal and steady labour relation with the platform and are subject to algorithm management.

- Many of these instant delivery workers are using electric bikes, and research has shown, both in the United Kingdom[43] and in France[44], that algorithm management pushes them to run risks (e.g., running red lights, cycling at night and in the rain, working very long hours), and has detected cases of minors

[42] The Moment of a force is a measure of its tendency to cause a body to rotate about a specific point or axis.
[43] Christie, Nicola and Ward, Heather (2023), "Delivering hot food on motorcycles: A mixed method study of the impact of business model on rider behaviour and safety", Safety Science 158 (2023) 105991
[44] Dablanc, L. (2023) Plateformes numériques de livraison : retour sur une recherche et un colloque. Note transmise par l'auteure, à paraître comme chapitre d'un ouvrage collectif dirigé par I. Daugareilh (Dir.).

taking up these tasks, through (illegal) rental of platform user profiles.[45]

Considering that cyclists and motorcyclists are usually classified as "vulnerable road users" (VRU), leads us to realise that electrification is rapidly expanding the number and type of "vulnerable road users on wheels".

One must point out, however, that VRU is a disputed concept[46] – it focuses attention on the action of potential victims, whereas the well-established and provenly effective Hierarchy of Controls[47] asserts that an effective safety approach must prioritise efforts on the source of danger (in this case, e.g., cars, vans, and heavy-duty vehicles). Rather than considering how to deter people from using these vehicles, we must acknowledge that their uptake will continue growing and consider instead how to make their use safer – and *that requires, unavoidably, changing the street and road environment and the heaver vehicles rolling on it*.

So, how can local and regional authorities improve safety for this electro-diversity? Here are four key recommendations:

1. *Segregating traffic* (i.e., allocating different types of vehicles to separate spaces) is a natural response but a limited solution. First, because of its applicability: segregated bike lanes are an indispensable measure for roads which, due to their network role, will always carry higher volumes of motorised traffic. However, in any city, these roads seldom represent more than 20% of the road network, and segregated bike lanes can hardly be implemented in the remaining 80%. Second, because intersections between segregated bike lanes and motorised traffic will always be inevitable.

2. *Reducing the speed of motorised traffic* is the most effective way of reducing the probability and severity of crashes and is an indispensable measure to improve the safety of all road users. In addition, by lowering the speed differential between cars and vans and other road users, reduced speed will also increase the appeal of sustainable transport modes, namely public transport, cycling and electric micromobility. Experience clearly shows that the speed of motorised traffic can be effectively reduced through a combination of reduced speed limits and traffic calming measures.

3. *Creating enough parking for shared micromobility* is an indispensable step to properly accommodate shared micromobility services and prevent deterioration of the pedestrian infrastructure. The fast deployment and growth of these services by private operators has contrasted, in many cities, with the slow and limited creation, by public authorities, of parking to accommodate them. Arguing that these services should have 'waited for parking to be available' before deploying ignores that the main problem is the socio-political inertia sustaining the monopoly held by the private car over on-street parking. To ensure adequate parking for shared micromobility, one must be proactive and consider (1) the number of spaces, (2) their spatial distribution, (3) their size, shape and capacity, (4) their shape and visibility, (5) their control by geofencing.

[45] Which, obviously, raises risks, but also legal and insurance coverage issues in case a crash occurs.
[46] Expert Group on Urban Mobility (2024)"Recommendations for the Commission's mid-term review of the EU Road Safety Policy Framework 2021-2030: With a specific focus on active mobility and road safety for Vulnerable Road Users", European Commission (approved 04.07.2024, pending publication)
[47] Cf. for example Occupational Health and Safety Administration (USA Government), "Identifying Hazard Control Options: The Hierarchy of Controls", accessed June 2024 (https://www.osha.gov/sites/default/files/Hierarchy_of_Controls_02.01.23_form_508_2.pdf)

Parking for individually owned light electric vehicles is also very important. These vehicles are more expensive, and if secure parking and charging are not available in proper facilities, they will be kept and charged indoors by their owners, creating a fire hazard.

E-FIRE?

Vehicle batteries can self-combust and explode. Risk is low, but can grow in light electric vehicles, particularly in uncertified batteries, subject to shock, vibrations, very high or low temperatures, and unsafe charging practices.

- How likely is it for an electric vehicle battery to self-combust and explode? The chances of that happening are comparatively low: according to a Swedish report, gasoline vehicles are nearly 30 times more likely to catch fire than electric vehicles.[48] Similar research recently concluded that 25 out of every 100.000 electric cars sold caught fire, while for ICE cars the ratio is 1.530 per 100.000. [49]

- The self-combustion and explosion of electric vehicle batteries is quite an impressive and rather novel type of occurrence, with surveillance footage often making the news and going viral on social media. This may explain the lack of correspondence between media attention and statistical reality. While we must guard against the distortions that salience bias[50] can cause to sound policy making and effective risk management, there are in fact relevant risks to consider.

- Just as with the fuel deposits in ICE technologies, battery fires can be triggered by violent shocks. In electric vehicles, battery fires can also be triggered by charging (both during and after).

- Why do batteries catch fire? Simply put, batteries are a way to store lots of energy in a very confined space. As such, batteries 'force' energy to be in a state that is not 'natural'. Energy wants to be unconstrained, 'free', it 'pushes' to become so, and combustion and explosion are ways to achieve that state.
- Damaged cells in a battery can experience uncontrolled increases in temperature and pressure[51], a phenomenon called "thermal runaway", a chain reaction that can cause a battery to overheat, catch fire, and explode.

In practice, different types of electric vehicles pose different risks:

- The manufacturing and sales of the electric batteries powering passenger cars, vans, buses and trucks are subject to strict quality assurance and control, and so is their respective charging infrastructure.

- The same level of quality control does not necessarily apply to the batteries powering some light electric vehicles (LEVs), particularly to those manufactured outside of the EU and purchased by individuals through online platforms.

- When properly manufactured and used, batteries are not dangerous. But they

[48] Berkeley Lab (2023), "Why Do Batteries Sometimes Catch Fire and Explode?", UC Berkeley College of Chemistry (https://newscenter.lbl.gov/2023/11/02/why-do-batteries-sometimes-catch-fire-and-explode/), and MSB (2024), "Sammanställning av bränder i elfordon och eltransportmedel år 2018–2023" (https://rib.msb.se/filer/pdf/29438.pdf)
[49] https://www.autoinsuranceez.com/gas-vs-electric-car-fires/
[50] Salience bias is a cognitive bias that leads us to pay more attention to what stands out from the ordinary, usually something that is new or unusual. The problem when it comes to policy is that it can lead policymakers to give more weight to what is more salient but not, objectively speaking, more relevant.
[51] National Transportation Safety Board (2020), Report SR 20-01, "Safety Risks to Emergency Responders from Lithium-Ion Battery Fires in Electric Vehicles" (https://www.ntsb.gov/safety/safety-studies/Pages/HWY19SP002.aspx)

do present a fire risk when over-charged, short-circuited, submerged in water, or if they are damaged.[52] Lower-quality batteries are, naturally, more vulnerable.

- The risks posed by low-quality batteries used in some LEVs are raised by their frequent subjection to shock, vibrations, and very high or low temperatures, all of which can damage battery cells and facilitate thermal runaways.

- These risks are further aggravated by the use of uncertified (and even counterfeit) third-party batteries[53] and unsafe charging practices, e.g., careless handling of swappable batteries, use of tampered or otherwise inadequate charging equipment, overloading of electrical connections, charging in indoor compartments without proper ventilation, etc.

The impacts of these battery fires also pose different challenges:

- Fires in electric cars, vans, buses and other heavy-duty vehicles powered by high-voltage lithium-ion batteries pose a serious risk of electrocution to emergency responders from exposure to the high-voltage components of a damaged lithium-ion battery. In the case of road crashes, emergency responders may have to manipulate parts of the vehicle to extract occupants from inside.

- Emergency responders must be trained and equipped to deal with these types of vehicles without running the risk of electrocuting themselves or the victims inside the vehicle. But training is not enough – how can this task be made easier, and less risky?

- Experts point out how LEV owners are usually unaware of the speed and violence with which the batteries equipping their vehicles can self-ignite and explode. These batteries are larger than the ones found in smartphones, and this violence grows exponentially.

- The context in which these events can occur is also a key factor to consider – a significant proportion occurs in indoor spaces, namely when batteries are left charging inside the home while the user is distracted in another part of the building or asleep.

- The hazard is posed not only by the fire itself but by the large volume of toxic smoke emitted right from the moment of self-ignition – experts point out that a person in the same room can become unconscious in 10 seconds and die soon after from smoke inhalation.

- As an expert pointed out, “we don’t bring a barrel of gasoline inside our house and keep it in your bedroom because of the fire hazard – we don’t look at batteries the same way, and yet we should seriously consider their fire hazard”.

- The London Fire Brigade, for example, reported attending over 116 fires involving e-scooters and e-bikes in 2022, the majority of them happening in homes, often caused when charging batteries.[54]

[52] London Fire Brigade, “Chargers, batteries and fire safety” (https://www.london-fire.gov.uk/safety/the-home/electrical-items/batteries-and-chargers/)
[53] BBC (2024), “Why the e-bike boom is raising fire fears” (https://www.bbc.com/news/business-68055288)
[54] London Fire Brigade, “e-Scooters and e-Bikes” (https://www.london-fire.gov.uk/safety/the-home/e-scooters-and-e-bikes/)

- The use of electric bikes for instant platform deliveries is also raising the fire hazard, particularly when large numbers of batteries are being charged in make-shift charging stations inside residential buildings and shops or storage rooms on ground floors, all of which with inadequate electrical facilities and non-ventilated compartments.[55]

What can be done to manage these risks?

- There is currently no EU-wide standard for safety requirements of lithium batteries, which results in a lack of standardised regulations. A first step was the development of EN 50604-1: 2016[56], but it has notbeen fully adopted by all EU Member-States yet.

- This is particularly relevant since, according to the EU, e-bikes are considered vehicles and require type approval, contrary to regular bikes. The same does not apply to e-scooters, unicycles, monowheels, and several other smaller light electric vehicles often sold over the Internet.

- Battery-swapping solutions are one way to minimise the risks of LEV battery charging. These solutions are being tested and demonstrated in EU-funded projects like SOLUTIONSPlus[57] and eCharge4Drivers[58].

- Creating specific facilities for safe indoor charging of LEV batteries in residential, office, and buildings open to the public would be very useful in reducing the risk. Regulatory requirements or, at least, formal recommendations and alerts by local, regional, national and EU-level authorities would be an improvement, in line with many other fire-related safety requirements established for new and existing buildings.

- A specific Taskforce of the EU Sustainable Transport Forum on Public Authorities[59] is currently working on drafting recommendations on fire safety of recharging infrastructure in roofed parking garages that will be public in 2024.

- In 2021, Transport for London banned e-scooters from London's transport network due to a number of fires on its network involving these vehicles.[60] Other public transport operators have been implementing similar measures in train, tram, subway and bus services. A blanket ban on e-bikes and other forms of e-micromobility in all public transport modes may be a legitimate temporary step but is not necessarily the best long-term solution.

Firstly, because the majority of batteries comply with safety standards and this will simply prevent citizens from switching their cars for more sustainable forms of mobility. Secondly, because while there certainly are risks for passengers, they are

---

[55] Associated Press (2023), "After fire kills 3, NYC officials say retailers, delivery apps must do more to ensure e-bike safety" (https://apnews.com/article/lithium-ion-batteries-ebikes-fire-new-york-c8b403a95d74f034ea46b64edd7774db)

[56] https://www.en-standard.eu/bs-en-50604-1-2016-a1-2021-secondary-lithium-batteries-for-light-ev-electric-vehicle-applications-general-safety-requirements-and-test-methods/#:~:text=This%20European%20Standard%20specifies%20test,for%20electrically%20propelled%20road%20vehicles.

[57] https://www.solutionsplus.eu/

[58] https://echarge4drivers.eu/

[59] https://alternative-fuels-observatory.ec.europa.eu/policymakers-and-public-authorities/policy-recommendations

[60] Transport for London, "Electric scooter safety" (https://tfl.gov.uk/modes/driving/e-scooter-safety)

different according to the type of vehicle, e.g., in a subway train running underground and in a bus, from which evacuation is much easier. Applying a blanket ban to all vehicles will deprive users of opting for the lower-risk vehicle and may lead to carrying concealed batteries in the higher-risk vehicles.

We also need proper education for policymakers, transport professionals and consumers about how lithium batteries work, what risks they pose, and what proper solutions should be considered for charging LEV batteries. But it must remain clear that education is an indispensable complement to robust regulatory action and should never be a substitute for it – that would make education an alibi.

IN CONCLUSION

The Climate Crisis is upon us and poses a direct and serious threat to our cities and our citizens. Road Transport is one of the major sources of greenhouse gas emissions and must undergo profound changes. The scale and speed of these changes are the biggest challenge ever faced by modern transport policy-makers, professionals, and users.

Electromobility is a very useful tool to decarbonise road transport – it does not address all the changes we need to implement, but it can and must play a key role. It is, therefore, mobilising political and financial capital, with public regulations demanding zero-emission cars and public investment supporting the growth of charging infrastructure.

History shows that in Transport (as in other human endeavours), the adoption of new energy systems will usher in a cascade of other changes – in vehicles and their roles (both functional and symbolic), services and their business models, infrastructure and its use. These changes are already happening because of Electromobility, and they're happening fast. We must steer them in the right direction.

History also shows that innovation rarely, if ever, waits for all policy considerations and regulatory frameworks to be in place before deploying. The latter are usually forced to follow, which creates an added layer of difficulty for those who must understand and deal with potential benefits and challenges, leverage opportunities, and manage risks.

And there are risks that must be considered – among those, risks for Road Safety and Fire Safety. Transport-related fatalities remain a major problem and must remain a priority. Particularly because, as the Safe System[61] and its successful implementation shows, we can address underlying structural factors and bring fatalities and serious injuries down to zero.

In this context, Electromobility poses a threefold challenge to Road Safety:

- How can we avoid the prolongation of existing problems?
- How can we avoid creating new problems?
- How can we profit from opportunities to improve?

This requires looking objectively and pragmatically at the risks that Electromobility may prolong and even aggravate, as well as those that it may create anew. We must not downplay those risks to somehow 'protect' the advance of Electromobility, and we must not let salience bias (or fossil fuel interests) blow them out of proportion with statistical reality.

We need a mature and proactive risk management approach. In way of a modest but concrete contribution, for this Report we looked into six key issues: the speed and acceleration of cars (already a major problem with ICE), the silence of all electric vehicles (and some of the solutions being devised to deal with it), the size and weight of SUVs (born of marketing preferences, not need), the installation of

[61] European Road Safety Observatory (2023), "Road Safety Thematic Report – Safe System Approach", European Commission (https://road-safety.transport.ec.europa.eu/document/download/b41a6def-25f2-41e0-a91a-6df965d20435_en?filename=Road_Safety_Thematic_Report_Safe_System_Approach_2023.pdf)

charging infrastructure in public space (and how it should not add to the clutter), the diversity and proliferation of light electric vehicles (and how we must make streets safer for them), and the fire hazards posed by batteries to both users and emergency responders.

In all of these issues, local and regional governments and transport authorities have key roles to play through their various roles – as regulators and enforcers of regulations, as planners and managers of transport systems, as shapers and allocators of public space, as active listeners and potential partners of the private sector.

There are concrete and viable ways for responsibly addressing these issues. Sustainability, safety and equity are different sides of the same issue: human transport. We must streamline these issues, overcome policy and professional silos through structured cooperation, learn from the lessons of the past, profit from the insights and opportunities of the present, have the political and professional courage to act, and the determination to follow through

.ACKNOWLEDGEMENTS

POLIS would like to thank the valuable support of all the people that contributed to this document, including the participants in the SOLUTIONSplus workshop "Electromobility & Road Safety: challenges and opportunities", several members of POLIS Working Groups for Safety and Security and POLIS Working Group for Clean Vehicles & Air Quality, including Angel Lopez (City of Barcelona), Ian Catlow (Greater London Authority), Joanna Holi-Sosnowska (City of Czestochowa), Josine Reijnhoudt (City of Utrecht), Pedro Fernández (EMT Madrid), Shalom Hakkert (City of Jerusalem), and Suzanne Andersson Falk (City of Gothenburg), and the external experts who agreed to kindly share their knowledge and expertise with us, including Hannes Neupert (eFlow Europe), Nick Tyler (University College London), Ralf Brand (Rupprecht Consult) and Toon Vervoort (Mobile Locker).

ABOUT POLIS

POLIS is the leading European network of cities and regions committed to transport innovation – specifically, to innovations that can make urban and rural mobility more sustainable, safe and equitable.

POLIS draws its expertise from a network of decision makers, technicians and managers working in authorities at local and regional level across the European Union.

Building on results developed in European projects and in thematic working groups that touch upon key transport challenges, we link innovation and public policy orientations on urban and regional mobility with European policy development.