MOVING UP A GEAR

ECOS VISION OF CLEAN AND SMART MOBILITY SUPPORTED BY ENVIRONMENTALLY AMBITIOUS STANDARDS
EXECUTIVE SUMMARY

Transport represents 27% of the greenhouse gas (GHG) emissions in the EU, with passenger cars accounting for 44% of this amount. The way we move is one of Europe’s biggest environmental challenges: to achieve climate neutrality we urgently need a shift to zero-emission transport. Public policies should encourage people to walk and cycle more, or use clean electrified public transport for longer distances. In addition, for cases where private transport is necessary, electric vehicles (EVs) should become the norm.

Thankfully, the urgently needed shift to EVs is in the making. In 2019, 3.6% of new cars sold in Europe were plug-in hybrid electric vehicles (PHEV) or battery-electric vehicles (BEV). During the first quarter of 2020 their sales accounted for 9.9% of all new cars sold. In the past 5 years EV sales have increased by 50% on average every year. This number is forecast to keep on growing significantly in the next decade as battery costs decrease, charging infrastructure expands, government incentives start to kick in, and manufacturers redesign cars so that they meet the more stringent emission rules in place.

That electric vehicle sales are on the rise is important and very positive, but we should not embrace the electrification of transport with our eyes closed. An electric vehicle revolution could also have negative consequences for the planet if policymakers do not act now to boost opportunities and tackle a number of outstanding transport issues, in particular related to environmental challenges presented by batteries, tyres and charging systems. The EU’s Sustainable and Smart Mobility Strategy, and its policy and legislative proposals, is the perfect opportunity for European policymakers to address these pressing environmental challenges.

BETTER DESIGN OF BATTERIES

Analyses consistently show that battery electric vehicles emit less CO₂ over their lifetime than diesel or petrol cars. However, the massive production of electric vehicles would also generate indirect emissions from electricity production, not to mention the pollution and carbon footprint of large-scale battery manufacturing. To avoid this, energy and material efficiency in battery manufacturing must improve, and the electricity used needs to be renewable. And to achieve this, we need policies and standards to require longer lasting batteries, strategies for more efficient battery reuse and recycling, as well as plans for sustainable and ethical sourcing of raw materials.

LOWER MICROPLASTIC RELEASE FROM TYRES

Car tyres release tremendous amounts of microplastics into the environment as they wear. Since EVs are heavier than conventional cars, their tyres could potentially shed even more microplastics if no innovation is brought to the market. To address this, policies and standards should forbid tyres that degrade too quickly, tyres should be designed to shed less altogether, and information regarding wear levels should be communicated to consumers and businesses through mandatory labels.

SMART CHARGING

A surge in energy demand from EVs will put extra pressure on the grid which should, and can, be managed. This can be done by enabling the EV fleet to charge smartly in (semi-) public and, especially, in private buildings. This way, EVs will help stabilise the grid instead of causing overload problems. Smartly plugging EV batteries to the grid would also prompt wider use of renewable energy, while reducing the need for stationary batteries and costly grid reinforcements. But to enable smart charging, the necessary standards should first be mandated and finalised at European level.

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6 Transport & Environment, “How clean are electric cars?” (April 2020)
Although electric vehicles have zero tailpipe emissions, they are not entirely emission-free. Levels of indirect emissions are linked to battery manufacturing, and the electricity production needed to power EVs, when it does not come from renewable sources. Because of the uptake of electromobility, the global lithium-ion battery market is expected to quadruple or even increase six times by 2021-2022 compared with 2017 levels. By 2040, according to the JRC projections, the global annual sales of lithium-ion (Li-ion) batteries will increase to around 4 TWh in the high scenario, corresponding to about 110 operational gigafactories, assuming 35 GWh annual production capacity for each gigafactory. For comparison, the sales volume in 2017 was about 60 GWh.

Battery production brings about a number of environmental concerns over the carbon footprint of the whole production chain, as well as pollution and serious material extraction issues. In the case of an electric vehicle battery, the production phase accounts for around 70% of its global warming potential. In addition, batteries contain elements such as cobalt, nickel or lithium, that are included in the European Union’s classification of Critical Raw Materials and for which manufacturers need to ensure responsible and ethical sourcing.

The production phase of batteries is the most environmentally impactful and energy intensive in the lifecycle: to make a 1 kWh battery, 100 to 200 kWh of energy are needed, as much as about 61 to 106 kg of CO$_2$-equivalent emissions.

It is evident that energy and material efficiency at manufacturing stage must be a priority in EV policies, going hand in hand with robust reuse and recycling rules.
WHAT CAN BE DONE?

The current legislative framework for batteries mainly includes the Batteries Directive (2006) and the End-of-Life Vehicles Directive (2000). As they are rather outdated, neither tackles EV batteries. In 2018, the European Commission decided to update its policies and adopted the Strategic Action Plan for Batteries\(^\text{11}\), with the ambition to make Europe a global leader in producing and using sustainable batteries that are safe, efficient and follow the highest environmental and social standards in the context of the circular economy. In 2020, as part of its Circular Economy Action Plan\(^\text{12}\), the European Commission announced it would develop a new regulatory framework for batteries, for which a legislative proposal is expected in December 2020.

Although standards have an important role to play in support of the upcoming regulatory requirements, they are currently inadequate, conflicting or altogether non-existent on key issues that could significantly contribute to the sustainability of the battery value chain\(^\text{13}\). It is therefore crucial that the existing standards are updated, and new ones are developed where lacking.

Standards should provide definitions, as well as technical and quality specifications for every phase of the value chain of a product, and create a level playing field. New standards are particularly needed to enable the assessment of the performance and durability of batteries, setting reliable metrics and evaluation tests. New standards are also needed to facilitate repair, reuse and recycling of EV batteries.

Batteries are a key element to decarbonising the energy and transport sectors. Ensuring that they are clean and sustainable under EU legislation needs to be a priority. In particular, the EU must make sure batteries are:

- Designed in a circular way;
- Contain raw materials that are sustainably and ethically sourced;
- Produced with a lower carbon footprint and using only renewable energy sources;
- Long-lasting and easy to reuse;
- At the end of their lives, easily collected and recycled.

Additionally, to improve the sustainability of batteries, the EU must accompany the new legislation with robust standards and requirements to increase battery lifespan, to allow second-life batteries and recycling, and to improve consumer information\(^\text{14}\).

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11 Strategic Action Plan on Batteries, Europe on the move, COM(2018) 293 final, 2018
12 European Commission, A New Circular Economy Action Plan - For a cleaner and more competitive Europe (COM(2020) 98 final), March 2020
13 The European Commission acknowledged a lack of standardisation in its report on the implementation of the Strategic Action Plan for Batteries (2019), where it is stated that minimum performance requirements have to be “supported by science-based harmonised standards, which will be used by industry to document compliance with the regulatory requirements laid down in EU legislation”
14 ECOS, The Positive Side of Batteries – The Role of Standards in Supporting Sustainability Requirements for Batteries, May 2020
TYRE ABRASION
A rolling source of microplastics release

Tyre wear is the main reason behind the unintentional release of microplastics into the environment\textsuperscript{15}, leading to 250,000 to 500,000 tonnes of microplastic pollution every year in the EU\textsuperscript{16} alone. This type of waste is mostly produced due to the degradation of tyres as vehicles are driven. Since the number of cars and trucks on the roads worldwide is set to increase sharply in the coming years\textsuperscript{17}, this issue needs a systematic solution.

Addressing microplastics release from tyres requires a mix of different instruments and the involvement of a variety of stakeholders. However, a number of steps can be taken already, such as reducing the amount of wear emitted per tyre, substantially improving tyre design to be less prone to wear, and showcasing this information to consumers. This would set us in the right direction, bringing benefits to human health and the environment.

WHAT CAN BE DONE?

- The new Regulation (EU) 2020/740 mandates that tyre labels need to include information regarding abrasion by 2025. To be effective, these requirements should be supported by appropriate standards. Therefore, the European Commission must urgently issue a standardisation request for harmonised test methods for the measurement of tyre abrasion to be developed as soon as possible and at the latest by 2023. This is of paramount importance as information on abrasion rates could help consumers choose tyres shedding fewer microplastics.

- Tyre design should be assessed. This includes tread patterning, carcass, tread stiffness and tread area, as well as materials used, such as the different types of polymers, fillers and additives. A mandatory legal threshold for tyre wear should be defined to exclude the worst performers from the EU market.

- Negative externalities from tyre wear particles should be quantified, including costs related to air quality, marine pollution and public health.

- Health and environmental impact for tyre emissions should be modelled to define upper and lower tyre wear limits to reduce particulates.


\textsuperscript{17} https://www.weforum.org/agenda/2016/04/the-number-of-cars-worldwide-is-set-to-double-by-2040
SMART CHARGING
Planning for sustainability

Electric vehicles are forecast to represent up to 9.5% of total electricity demand by 2050. Electricity grids will be able to cater for this additional demand – but certain conditions will need to be met. If EV charging is not managed properly, EVs could temporarily surpass grid capacity at local level, leading to power shortages. This would be the case when many people charge their car simultaneously, for instance when returning from work, while others turn on their televisions and dishwashers.

Fortunately, these peaks can be managed with ‘demand response’. Electricity prices could encourage EV drivers to adjust their consumption patterns and charge their EVs in a smarter way. This has numerous advantages such as lowering the cost of owning an EV, integrating more renewable energy to the grid, and avoiding costly grid reinforcement measures.

Importantly, smart charging can contribute to a greener grid, too. By charging when abundant renewable energy is available (and prices are lower), the clean energy is stored inside the EV battery. This energy can then be used to drive, power up a building or device, or even be returned to the grid. Furthermore, EVs can also act as energy storage for locally produced renewable energy, which reduces the need for stationary batteries.

There are countless examples of EV smart charging whereby the vehicles provide flexibility to the grid:

- Peak load shaving: Postponing charging to moments of lower electricity demand;
- Charge when renewable energy supply is high;
- Return electricity to the grid;
- Store energy from locally produced renewable energy;
- Act as emergency power supply in case of power disruptions, or off-grid leisure applications.

Currently, smart charging is possible but relies on proprietary solutions that are not interoperable. This means EVs may not be compatible with the smart charging software of other manufacturers, creating a closed ecosystem. Furthermore, payment options at public charging stations are not harmonised across charging stations and Member States. Worse still, some customers cannot freely choose their e-mobility service provider (enabling charging by assisting drivers to find charging stations and offer payment solutions), or integrate their EV into any home or fleet management system.

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WHAT CAN BE DONE?

To make smart charging a reality, key standards need to be agreed. Besides, infrastructure and electricity market legislation should allow and encourage smart charging. To ensure smart charging functionalities run smoothly and to enable communication between a building and the grid, as well as between a charging station, the car and the grid, standardised communication interfaces and data models are needed. These can be ensured by smart charging standards, which are still being developed by the international standardisation bodies: the International Standardisation Organisation (ISO) and the International Electrotechnical Commission (IEC).

The most important standards currently under development are:

- **ISO 15118-20** will standardise a whole range of essential smart charging features, including the vehicle-to-grid (V2G) technology, enabling ‘bidirectional power flow’. This feature ensures energy can be returned to the grid. This standard is expected to be published by the end of 2021. Interoperability tests will then need to be defined for the standard to be operational on a large scale by 2023-2025.

- **EN 50491-12-2 Customer Energy Management (CEM)**: This standard manages the power flow inside a building as well as power exchanges with charging EVs to provide the needed grid flexibility. It will be published by the end of 2021.

- **IEC 63110 "Charging Station Management"**: It will ensure the communication between the charging station and the software of its operator, as well as the integration of EVs in energy management systems, such as CEM. The standard is still in an early drafting phase.

- **IEC 63119 "Charging Service Providers"**: The standard managing roaming and payment of EV charging services. First parts of the standard are expected to be published after 2022. However, crucial data transparency obligations for EV manufacturers are not included in the standard, which makes it unfit to ensure that EV users are free to install any contract certificate they desire or integrate the car into any home or fleet management system. Open documentation is crucial in cases where EV manufacturers are unable or unwilling to support technical standards.

- **EN 50549** is an existing standard, establishing the requirements for power generating plants to be connected to distribution grids. This is needed for the grid to remain stable even if a large number of EVs are connected. Unfortunately, the standard is unfit for purpose and should be revised, or a new standard should be drafted to ensure that EV manufacturers implement grid stability requirements for smart charging, similar to standards already mandatory for power generating plants.

THREE EXISTING EU POLICIES WITH THE POTENTIAL TO SMARTEN UP ELECTROMOBILITY

The main EU policy instruments to support smart charging are the **Alternative Fuels Infrastructure Directive (AFID)**, the **Energy Performance of Buildings Directive (EPBD)** and the **Trans-European Networks for Energy (TEN-E) regulation**.

The AFID sets the framework for public and semi-public charging stations in Europe. The European Commission plans to present its proposal for a revised AFID in June 2021.

This piece of legislation should mandate smart charging where it makes most sense, for instance in commercial buildings and parking lots. Currently, it is not possible to upgrade charging stations to smart ones since the standards are not ready, but this should be foreseen as soon as feasible. To speed up this development, the standardisation request to the European standardisation bodies, which is currently being developed, should prompt the adaptation of key smart charging standards to support European legislation.
Under the current EPBD, renovated buildings must provide the necessary cabling to install EV charging - but they do not have to be smart. The planned revision of the EPBD should amend this so that smart charging becomes the norm in homes and office buildings, where most charging will be done.

Finally, the TEN-E regulation, which funds cross-border energy transmission infrastructure, should provide more funding for smart grid infrastructure by changing the eligibility criteria for funding smart grid projects.
ECOS is an international NGO with a network of members and experts advocating for environmentally friendly technical standards, policies and laws.

We ensure the environmental voice is heard when they are developed and drive change by providing expertise to policymakers and industry players, leading to the implementation of strong environmental principles.