LIGHT VEHICLES HEAVY IMPACTS

Political debates related to noise and air pollution are often ignore the negative externalities of mopeds and motorcycles.

The **LENS project** aims to provide tools and enforcement techniques for cities, as well as suggestions for legislative changes to curb pollution of L-vehicles (2- and 3-wheelers, such as mopeds, motorcycles and trikes).

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Imagine a busy urban European street in the summer. You will probably picture a traffic mix of buses, passenger cars, motorcycles, mopeds, cyclists, pedestrians, and delivery vans; tourists strolling from a museum to an ice cream parlour; a long line of vehicles slowly moving over the boiling-hot asphalt during rush hour. The air is filled with the smell of burned fuel, emissions, and noise from rattling engines, tailpipes, and squeaking tires.

You might wonder which mode of transport emits the most noise and air pollution. As we all know, active mobility and public transport are relatively calm and clean mobility solutions.

Decarbonisation and electrification efforts of passenger cars with EURO norms and charging infrastructure investments are showing effects: 44.1% of newly registered cars are either battery-electric (12.1%) or a form of hybrid vehicle (32%).

Additionally, urban vehicle access regulations prohibit high-polluting vehicles from entering many cities. Emitting very little, mopeds, motorcycles, and trikes, otherwise grouped as light – or L-vehicles, are significant, but often overseen noise and air pollution factors.

A unique project aims to solve this challenge by providing advice to enforcement agencies, L-vehicle users, cities, and political decision-makers on how to curb emissions, set up a proper enforcement strategy, and select a vehicle with low environmental and noise impact.

This ambitious EU-funded project, which is supported by POLIS, is called LENS. It brings vehicle manufacturers, research institutes and academic experts together to tackle the significant challenge of L-vehicle pollution.

Motorcyclist in Rome
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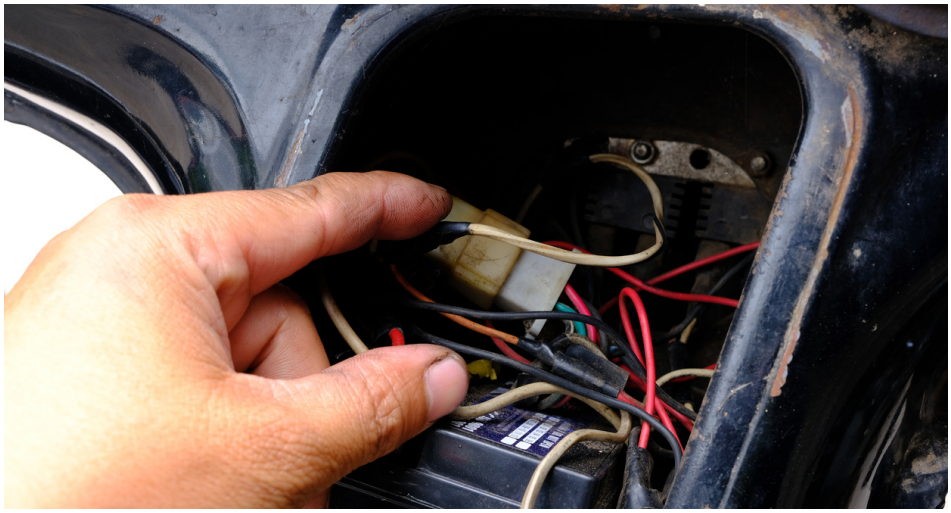
Ambiguous regulation and lax controls of L-vehicles pose a health problem

Since the Diesel Gate, which occurred nearly a decade ago, emissions of passenger vehicles were in the spotlight of European policymakers, who understood that laboratory tests and real-world emissions can differ significantly.

The Euro 7 emissions reduction level is currently being discussed for cars, vans, and trucks, while smaller vehicles like mopeds and motorcycles are currently regulated at a Euro 5 level for both noise and pollutants emissions. However, the real-world performance of vehicles over their lifetime often differs from their newly-purchased condition. This can be due to various reasons, such as malfunctions of the emission control system, wear and teas, as well as poor maintenance and congestion.

Although these technical reasons may be somewhat justifiable, what is not, is to deliberately bypass regulatory provisions either through system design or through tampering. Such actions lead to substantially higher levels of pollutant and noise emissions, causing a disproportionate annoyance and health burden for city dwellers and inhabitants next to noisy country roads. These unfavourable circumstances can only be avoided through effective monitoring of pollutant and noise emissions from actual vehicles on the road.

Whereas EU norms for air pollution of L-vehicles exist, noise pollution is a notoriously neglected topic. Certainly, Commission Regulation (EU) 2017/1151 and Regulation (EC) No 715/2007 set emission standards and testing procedures for L-vehicles. Nevertheless, illegal tuning and modification, the so-called 'tampering', remains a significant challenge, alongside with the lack of EU-wide rules related to noise emissions and standardised enforcement protocols.



Minor tampering attempts can have significant effects on vehicle pollution

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Thus, inhabitants of urban environments and people who live along roads that are frequented by motorcycles are suffering from the loud noise of two-stroke engines.

Since L-vehicles have a low fuel consumption and are a cheaper alternative to cars, this vehicle type is very popular, as shown by 1 million registrations in the last pre-pandemic year of 2019. Due to higher fuel costs, which soared up to 2€ per litre in Italy, the country with the highest number of L-vehicle registrations in Europe, one can identify that the reduction/curbing of L-vehicles is an important step.

LENS: an ambitious project

The EU-funded LENS project is dedicated to providing solutions to the currently existing gaps in the legislation, including suggestions and solutions for all stakeholder groups involved, from decision-makers and city representatives, user groups, enforcers, and potential future owners of L-vehicles. Thus, the project will suggest regulations to reduce emissions of new vehicles, provide solutions for tampering detection, and create a smart app to provide emission information to users who consider the purchase of a motorcycle or moped.

Besides the policy- and user-focused solutions, thorough testing of noise- and air pollution emissions will be conducted on 150 different vehicles and in different testing environments, including in-lab and on-board in real-world environments, all in combination with real-world sampling campaigns, which aim to collect data from 3,000 vehicles. As a world's first, the tests will be extended to emissions of ultrafine particles and not only to gaseous emissions: this will allow for a more comprehensive collection of data from a full range of vehicle emissions, which will help regulators develop comprehensive emission control regulations.

Thanks to the support of manufacturers, such as KTM, BMW, and Piaggio, which will provide the technical expertise for the analysis of vehicle components, efficient tests are guaranteed. These vehicle tests will span different price segments, engine sizes, and user groups, ranging from the casual urban commuter that uses a moped to the recreational user of high-powered motorcycles.

LENS aims at making sure that excess pollutant and noise emissions from mopeds and motorcycles are early identified and that regulatory and enforcement authorities have all the necessary technical tools at hand to detect unlawful acts and enforce corrective actions swiftly.

Illegal motorcycle tampering increases noise and air pollution
Arthur Bargan, Shutterstock

Engaging users, stakeholders, and cities

Before being able to perform the first vehicle tests and offer emission reduction solutions, the most common methods of tampering need to be assessed. Thus, LENS partners are currently identifying these methods through voluntary, anonymised, and randomly selected survey participants, who regularly use their L-vehicle with at least one or more modifications. Questions are based on an extensive list of potential modifications that were identified by OEMs, workshops, and groups of enthusiasts. Upon completion and evaluation of the user surveys, a list of the most common tampering methods shall be compiled, to verify whether these correlate with some basic user characteristics (such as age, gender, and country). LENS currently conducts face-to-face and online questionnaires to gather data from users across Europe.

Additionally, POLIS network has set up a stakeholder group and a city platform, which will allow enhanced exchange and sharing of best practices across Europe to address the different challenges related to noise- and air pollution. This is essential, as the impacts of L-vehicles strongly differ between European regions with higher usage, due to economic circumstances, weather, terrain or access regulations.

Motorcyclist in Amsterdam
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LENS L-vehicles Emissions and Noise mitigation Solutions