



POLICY BRIEF

Driving Towards Cleaner Oceans: Addressing the Threat of Car Tyre Emissions

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SUMMARY

The use of vehicles on wheels as a means of transport has become an integral part of modern life, but this comes at an environmental cost. Nowadays, it is becoming increasingly recognized that a major source of river and ocean plastic pollution comes from vehicle tyre wear. Urgent actions are required to address this, as to date, particulate emissions from tyres are not yet fully regulated in the EU. In this policy brief the problem of particle emissions from car tyres is described and recommendations for policymakers are outlined to address this problem.

DESCRIPTION OF THE PROBLEM

The abrasion of car tyres moving on the road surface creates small particles that are released into the environment, where they can harm ecosystems and human health.

Once released, these tyre wear particles (TWP) stay on land and accumulate in soils, while a fraction ends up in freshwater and marine systems. Car tires are indeed now considered to be a major source of river and ocean microplastics, with studies estimating that between 5 to 10% of the total amount of plastics ending up in our oceans comes from TWP (IUCN, 2017)¹.

These micronized tyre rubber and tyre wear particles have recently gained attention as black particles found in surface water, soils, sediment, air and waste water treatment samples worldwide. A main pathway for these particles to reach the ocean is through road side drainage systems that are connected to rivers and the sea. After heavy rains, road stormwater runoff leads to particles entering drainage and sewer systems, wastewater treatment plants, rivers and eventually ending up in the ocean. The fractions that get trapped



in sediments on the way are currently unknown. Airborne transport of these particles is also of concern, as wind-borne microplastics can be easily blown furth and remain suspended in the atmosphere, finally depositing on land away from its sources and in the oceans. Looking at it from a life cycle perspective, re-use (e.g. as infill for artificial turfs) and improper disposal of tyres into the environment also has the potential to generate and release microplastics. Particles released by tyre wear can be as small as the traffic pollution particles released from car exhausts into the atmosphere (smaller than 2.5 microns), known to negatively impact human health. The environmental issue is highly amplified by the fact that TWP are composed of a wide range of potentially harmful compounds, including fillers (such as carbon black, clay, silica, and calcium carbonate), stabilizers (antioxidants, antiozonants, and waxes), cross-linking agents (sulfur, accelerators, and activators), and secondary components such as pigments, oils, resins, and short fibers. Vehicles on wheels, from personal cars to commercial trucks, are a central part of society and the economy, which makes it an enormous challenge to address the problem of particle tyre emissions. Furthermore, it is anticipated that road traffic will surge, including the usage of electric vehicles. Since electric vehicles are typically heavier than cars with a gasoline engine, this might result in an increase in tyre wear. According to EU projections, passenger transportation is estimated to rise by 42% by 2050, while

freight transport is expected to increase by 60% (EC 2019)². Moreover, the passenger car fleet is getting larger and more potent, exemplified by the rise of sport utility vehicles. If nothing is done in the future, the pollution from TWP is very likely to increase. Therefore, it is essential that solutions and strategies are found and put in place in order to (1) reduce car tyre particle emissions, (2) minimize their fluxes into land and aquatic systems, and 3) mitigate their toxicological impact on biota and human health.

Currently, there is no specific EU regulation or directive in place to tackle the problem of particle emissions from car tyres. However, there are existing regulations and directives that indirectly address this issue. For example, the EU has set limits for particle emissions from vehicles under the Euro emissions standards, which indirectly affect tyre wear emissions. Additionally, the EU has established the Tyre Labelling Regulation, which requires all tyres sold in the EU to be labeled with information on their fuel efficiency, wet grip, and external rolling noise. This regulation encourages the production of more fuel-efficient and eco-friendly tyres, which can indirectly reduce tyre wear emissions.

Nevertheless, regulations and directives need to promote a more comprehensive approach that includes encouraging the adoption of technologies that reduce tyre emissions into the environment and associated chemical hazards, as well as pushing forward the use of alternative modes of transportation, and other actions such as the responsible tyre disposal practices and the increase in scientific and public awareness. In the optic of the LABPLAS project, it is needed to strengthen the understanding of the fate and transport behavior of plastic from different sources to the ocean, in particular from TWP. It is essential to identify and quantify their main sources and the processes that influence the fragmentation and transport of these particles and how they negatively impact biota and human health.

RELEVANCE TO LEGISLATION



The Euro 7 standards will be the first global emission regulations to go beyond controlling exhaust pipe emissions and establish additional restrictions on brake particulate emissions, as well as regulations on microplastic emissions from tires. These requirements will be applicable to all types of vehicles, including electric ones. (https://ec.europa.eu/commission/presscorner/detail/en/ip_22_6495)



The EU tyre label regulation (EU 2020/740) (<https://www.etrma.org/key-topics/tyre-regulations/>)



EU planned actions to tackle the issue of plastic pollution addressing both intentional and unintentional sources of microplastics https://environment.ec.europa.eu/topics/plastics/microplastics_en

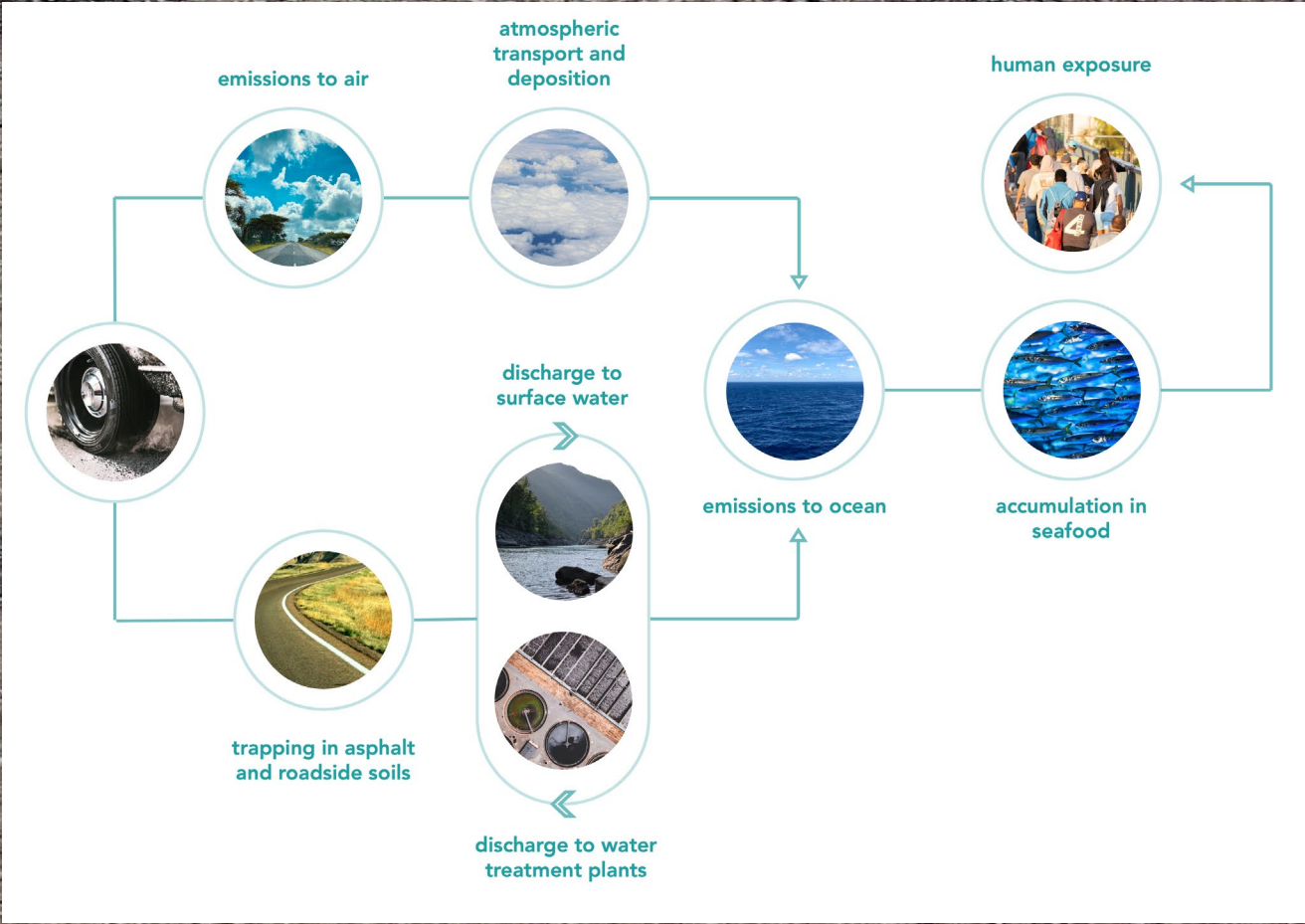
POLICY CHALLENGES

The generation of TWP is complex and can be influenced by various factors such as tyre characteristics, vehicle characteristics, road surface characteristics, driving behavior, tyre maintenance, composition and intensity of road traffic, and weather conditions. One of the greatest policy challenges is the limited understanding of TWP and its influencing factors due to relatively recent concerns about its environmental impact and the lack of good methods to detect these particles, creating knowledge gaps regarding the sources, emission drivers, fate, and impacts

of TWP in the environment as well as on human health. To prevent the generation of TWPs, and retain the emitted particles, a technology development and research effort is needed on the development of mitigation measures, their feasibility of implementation and their potential effectiveness.

The LABPLAS project is focused on contributing to overcome some of the challenges. Firstly, it aims to develop reliable analytical methods for determining microplastics and tyre wear markers in

environmental samples, such as road dust and water run-off. This will help to evaluate the contribution of run-off waters to microplastic emissions. The project also seeks to identify the main sources, transport mechanisms, and fate of microplastics and TWP, in order to fill knowledge gaps and propose targeted mitigation measures that are effective in reducing their impact on the environment. Additionally, a unique aspect of LABPLAS is that it will map the TWP problem together with stakeholders (e.g., the tyre industry, water managers and road builders) in order to develop a common understanding of the problem and to identify appropriate mitigation measures.



POLICY RECOMMENDATIONS

- Focus on clean-up and retention technologies in drainage systems in road networks to collect the emitted particles, such as sediment interception systems, hydrocarbon interception systems and storm water attenuation systems. This measure does not reduce emission of particles, but decreases their accumulation in the environment.
- Promote the reduction of journeys taken by car, replacing them by public transportation and rail. This reduced car usage would be an effective policy solution to decrease particle emissions, since these emissions depend on the distances traveled by vehicles.
- Incentivize the research and adoption of technologies reducing the amount of plastic released through wear and tear, such as using more durable and natural materials as well as improving the lifespan of tyres.
- Require that regulations and standards addressing plastic pollution reduction take into account TWP and its characteristics, including the different types of tyres and environmental conditions determining abrasion.
- Regulate the use of additives and chemical substances in tyre production, such as setting maximum

limits, and encouraging the use of safer alternatives. Increasing transparency allows consumers to make informed decisions when purchasing tyres. A tyre certification system should address additives and chemical substances, as well as other aspects such as the durability of the tyre and the persistence of the wear particles in the environment.

- Collaborate with international partners: as car tyres are manufactured and sold globally, the EU must work collaboratively with international partners to ensure that its policies and regulations are effective.
- Promote responsible tyre disposal practices, like requiring tyre retailers to take back used tyres from customers and foster sustainable end-of-life programs for tyres as well as incentivize owners of older cars to replace them with newer, more environmentally friendly models. Promoting sustainable mobility solutions and improving road maintenance.
- Encourage research that can inform policy decisions concerning the environmental impact of TWP and increase public awareness of the plastic pollution caused by tyre emissions.
- Foster research and development focused on harmonizing sampling, sample preparation, and analytical methods to gain better understanding of the issues related to tyre wear particles.

1 Boucher, J. and Friot D. (2017). Primary Microplastics in the Oceans: A Global Evaluation of Sources. Gland, Switzerland: IUCN. 43pp.

2 European Commission - Directorate-General Mobility and Transport (2019). Transport in the European Union – current trends and issues. Brussels, Belgium: DG MOVE. 171 pp.