

NON-EXHAUST PARTICLE EMISSIONS FROM VEHICLES

BACKGROUND

Following the submission of informal documents by the Russian Federation, UNECE WP.29 agreed with the GRPE decision to assign the follow-up of the issues concerning the emissions of particles from tyre and brake wear to the PMP informal working group.

In the 68th GRPE session of January 2014, the topic of traffic related non-exhaust particle emissions was further discussed. GRPE acknowledged the information provided by the PMP informal working group and the Russian Federation and requested the PMP group to propose in the June 2014 session of GRPE a possible roadmap on how to proceed further with the issue of particles from tyre and brake wear.

INTRODUCTION

Several aspects should be considered when assessing the relevance of non-exhaust traffic related particle emissions, and particularly those generated as a result of brake and tyre and road wear, in human health.

For some of these aspects available literature data is sufficient to draw conclusions since there is a general consensus among the scientific community. More specifically available data provides a quite clear picture, even if with some uncertainties, of the contribution of brake and tyre and road wear particles to traffic related particulate matter (PM) emissions as well as of the typical PM₁₀ emission factors, mass and number size distribution and chemical composition of these particles.

On the other hand, there are many other aspects for which the current knowledge is not sufficient to reach sound conclusions. This is due in some cases to the scarcity of data, while in other cases the results reported in the publicly available studies are not consistent or even are contrasting as a consequence of the use of different measurement techniques and sampling procedures. How non-exhaust wear particles are dispersed in the air and what is the fate of bigger wear particles, the exposure of the population to those particles, the impact of wear particles on human health, how

influencing factors affect wear particle emissions, the effectiveness of technological and non-technological mitigation measures, are among the issues that should be further investigated.

A summary of the level of knowledge and the still existing gaps is provided in the Annex I.

Addressing these many open issues related to non-exhaust particle emissions would require large projects with a multidisciplinary approach. These projects should involve experts from many different specialized fields (i.e. braking systems, tyres, air quality, modeling, transport infrastructures, mobility planners, health science, impact assessment) as well as field and laboratory experimental activities. Important financial resources would be also needed.

The PMP group activities since its inception, focused on development of an alternative metric with increased sensitivity compared to the existing particulate matter mass measurement system for heavy duty and light duty engines / vehicles (M and N category vehicles). For that reason the PMP group comprises mainly experts from the field of exhaust emissions, as well as experts on techniques and sampling systems to characterize particles emitted by engines.

Due to the complexity of the matter, and considering the existing mandate, the expertise and the limited resources available within the PMP group, it is the view of the group that a valuable contribution can be provided only on specific but still important issues. More specifically, the PMP group believes that the experience acquired over more than 10 years of research on particle emissions can be an important forum where valuable help on the **development of a set of recommended measurement techniques and sampling procedures**, the **investigation of typical driving patterns**, the **compilation and monitoring of on-going research projects**, as well as the **networking and exchange of information with experts in the field of non-exhaust traffic related particle emissions** could be provided.

PROPOSED APPROACH

STRUCTURE OF THE GROUP

It is proposed that the PMP group will address the issues related to non-exhaust traffic related particle emissions listed in the next section without creating a new informal group.

Experts in other fields relevant to the addressed topics will be invited to attend the informal meetings of the PMP group that will be split into two sessions, one dedicated to exhaust emissions and the other to non-exhaust traffic related particle emissions.

SCOPE AND WORK ITEMS

The scope of the activities to be carried out within the PMP group related to non-exhaust traffic related particle emissions will focus on the following sources: brake wear, tyre and road wear, clutch wear.

As far as clutch wear is concerned, due to the enclosed nature of the clutch mechanism it is likely that most of the wear material is retained inside the housing. However, existing literature data do not provide much information and therefore further investigation is necessary first of all to understand the relevance of these emissions.

Road dust resuspension was decided not to be examined - at least within the PMP group - due to the fact that resuspended dust derives from multiple sources, some of which are not traffic related (i.e. industry, natural sources). Additionally, dust resuspension is not a direct source of particles in the environment like all other non-exhaust traffic related sources, and it can also be a result of other factors than traffic (i.e. wind).

The PMP has identified the following work items:

- **Investigation of typical driving patterns and in particular of typical accelerations/decelerations.**

Objective: Driving conditions have obviously a large influence on wear processes. The activity data collected in the framework of other projects (e.g. WLTP) will be reviewed in order to derive the typical acceleration / deceleration frequency distributions. The objective of this activity is to reach a shared definition of typical/normal driving conditions as well as of severe, extreme or infrequent conditions. The definition of typical or normal driving conditions will narrow down the range of driving conditions to be taken into consideration as far as non-exhaust particle emissions are concerned. This will be helpful both for the review of the existing data which was sometimes derived under extreme driving conditions, and for future studies.

- **Compilation and monitoring of the on-going research projects on non-exhaust traffic related particle emissions.**

Objective: There are several on-going research projects, some funded by the EU (e.g. REBRAKE) some by other organizations, that address different issues and very often are not known outside the involved groups or organizations. Information (objectives, timing, experimental approach, expected results) about these projects will be collected in a living document that would be regularly updated. Whenever possible, meetings between the PMP group and the main actors of the projects will be organized to promote the exchange of information and monitor the progress achieved. This will be mutually beneficial both for the PMP group and the groups involved in the projects (better focused research activities, extended expertise, more complete technical and instrumental support, avoid of duplications/overlapping).

- **Networking and exchange of information with experts in the field of non-exhaust traffic related particle emissions.**

Objective: Promoting the exchange of information among the PMP group and the renowned experts in the field of non-exhaust traffic related emissions. As an example, non-exhaust traffic related particle emissions, mainly due to the use of studded tyres and road salt over the winter season, are of high concern and interest in Nordic Countries and a lot of experience is available on the effectiveness of different mitigation measures.

- **Development of a set of recommended measurement techniques and sampling procedures.**

Objective: The lack of standardized approaches in investigating the different aspects of non-exhaust traffic related particles has often led to inconsistent or even contrasting results. A set of recommended measurement and sampling procedures will be developed as a guideline for future studies.

