

Skipped Sources: From Tyres to Brakes

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Air pollution from the transport sector is one of the major challenges plaguing cities worldwide. Pollution from the sector is generally assumed to be from tailpipe emissions from vehicles. However, emerging evidence shows that non-exhaust emissions (NEEs) from vehicles also produce a significant quantity of tiny and toxic particulate pollutants. These pollutants can deteriorate the air quality and cause adverse health impacts.

NEEs are particulates that are produced from the wear and tear of vehicle parts such as brakes, tyres, and clutches. They can also be generated through resuspension of roadside dust or road surface wear as vehicles move over a road surface. NEEs generated through these processes mostly comprise rubbers, polyesters, carbon black, plasticisers, metals, and carcinogenic polycyclic aromatic hydrocarbons.

A UK government report released in 2019 titled 'Non-Exhaust Emissions from Road Traffic' highlights that pollution from NEEs is 1,000 times worse than exhaust emissions.

Challenges in controlling NEEs

When NEEs are generated, they usually settle down with roadside dust. Presently, in most Indian cities, roadside dust is cleaned by manual sweeping using brooms. However, the effectiveness of this method in removing tiny particles generated from NEEs is difficult to assess. Studies are

required to determine whether the existing broom-based sweeping practice is effective or new techniques — such as vacuum-, mechanical-, or sprinkler-based sweeping — need to be introduced.

Another aspect that is often not discussed is the impact of electric vehicles (EVs) on NEEs. With the introduction of EVs, a substantial reduction in exhaust emissions is expected. However, the effect of EVs on NEEs is yet to be studied comprehensively. Several studies have stressed that EVs are slightly heavier than their internal combustion engine counterparts because of heavy batteries. So, there is widespread speculation that there could be more tyre wear, road wear, and roadside dust resuspension while driving EVs compared to internal combustion engine vehicles. However, the improved regenerative braking systems in EVs ensure emission-free braking.

The way forward

Despite the potential adverse impacts, there have been very few studies on NEEs in India, owing to the challenges involved in their measurement in the real-world environment. Receptor models such as Chemical Mass Balance (CMB) or Positive Matrix Factorisation (PMF) are typically used to measure or quantify a polluting source. In many countries including India, NEE source profiles are unavailable, which makes it impossible for the CMB model to quantify NEE sources.

Additionally, the lack of information on the chemical composition of brake and tyre materials makes it challenging to substantiate results from PMF. Therefore, more research needs to be carried out to identify the chemical composition of brakes, tyres, and other materials that can wear down upon use.

Unless a standardised measurement method is introduced, it will be difficult to frame a permissible limit for NEEs that vehicles need to comply with. The Government should, therefore, encourage research on this unexplored domain in India while improving public transportation and framing effective strategies to remove roadside dust.

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