Abstract:

**Real-World Motorcycle Emissions**

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The recent announcement that from 8th April 2019, the London Ultra Low Emission Zone (ULEZ) scheme will include charging for motorcycles, mopeds and scooters that do not meet EURO3 standards received negative coverage in both trade and public media. Many noted that the national motorcycle fleet is small and contributes relatively little to road transport emissions (e.g. about 2% and 0.3% to PM and NOx, respectively). Some even went on to identify the strategy as a mistake and to highlight a move from cars to motorbikes as a mechanism for reducing both emissions and congestion. But, most importantly, many noted that most other cities were not planning similar actions and asked why London was picking on motorcyclists?

Here, as part of that discussion we present recent evidence on motorcycle emissions from both remote sensing and PEMS studies.

Early findings, although tentative, indicate that motorcycle CO, HC, NOx and CO2 emissions have not changed significantly in the last two decades, and, CO and HC motorcycle emissions now exceed those of modern cars on a g/km basis and even NOx emissions are of comparable orders of magnitude under urban driving conditions. This trend most likely reflects both the more aggressive regulation of car emissions and the greater challenges in the engine management and after-treatment of the much more transient real-world emissions of motorcycles. PEMS data, in particular, provides significant evidence on the delicate balance between lean and rich engine modes, and the emission penalties of combinations like cold start fuel enrichment and hot transient exhaust flow rates. Here, we also acknowledge the critical role of small, light-weight sensor-based PEMS in collecting representative real-world motorcycle emissions data.

In recent years, a relatively large increase in smaller motorcycle, moped and scooter use, linked in part with increased high-intensity use by delivery services in urban areas, means that while motor cycles emissions inventory contributions are still by no means equal to those of cars, they are becoming increasing significant in the most populated and polluted areas, supporting the case for early preventive action.

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