

## Investigating real world vehicle emissions in the UK using a remote sensing technique

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Reducing ambient  $\text{NO}_x$  and  $\text{NO}_2$  concentrations in urban areas across Europe remains an important air quality challenge. Direct emissions of  $\text{NO}_2$  from road vehicles have been shown to contribute significantly to some of the highest ambient  $\text{NO}_2$  measurements recorded in urban areas. In this study, real-world vehicle emission measurements have been made in both York and London (UK) using a remote sensing technique known as Fuel Efficiency Automobile Testing (FEAT). The FEAT system was developed at the University of Denver and is a spectroscopic technique capable of directly measuring  $\text{NO}_2$ ,  $\text{NO}$ ,  $\text{NH}_3$ ,  $\text{CO}$ ,  $\text{CO}_2$ ,  $\text{SO}_2$  and hydrocarbons emitted from individual vehicles. Emissions from over 20,000 vehicles have been measured at around 5 different measurement sites in the UK, and using number plate recognition, the measurements have been matched with comprehensive vehicle information data. This approach has provided an in-depth characterisation of emissions from across the vehicle fleet (e.g. passenger cars, buses, vans and HGVs) and has allowed for factors affecting vehicle emissions, such as vehicle age and engine size, to be extensively studied. Furthermore, the vehicles measured in this study have been categorised according to their Euro classification, and directly compared to their corresponding Euro emission standards. The proportion of  $\text{NO}_x$  that is present as  $\text{NO}_2$  in vehicle exhausts, as well as the total amount of  $\text{NO}_x$  in the exhaust, are important issues to address if we are to resolve issues related to urban concentrations of  $\text{NO}_x$  and  $\text{NO}_2$ . In recent years it has been found that the fraction of  $\text{NO}_2$  in vehicle exhausts has increased, and that the total  $\text{NO}_x$  from diesel vehicles has not decreased as expected. Recent findings in this study allow us to provide up-to-date information on how modern Euro 6 vehicles are performing under a range of urban driving conditions.