



Real Driving NO_x Emissions of Public Buses in Urban Traffic

Denis Pöhler (1,2), Joscha Reber (1), Tobias Engel (1), Johannes Lampel (1,2), Martin Horbanski (1,2), Ulrich Platt (1,2)

(1) University of Heidelberg, Institute of Environmental Physics, Heidelberg, Germany
(denis.poehler@iup.uni-heidelberg.de), (2) Airyx GmbH, Eppelheim, Germany

NO₂ air pollution is currently the main problem of European cities. The source of NO₂ and NO_x (NO₂ + NO) is mainly traffic, especially from diesel engines. In urban areas with high bus traffic, the NO_x emissions of these buses may contribute significantly to the currently observed NO₂ pollution. As the real driving emissions of NO_x can differ largely from the allowed emission limits for various vehicles, it is necessary to measure these emissions during real driving to obtain a realistic picture of the dominating urban NO_x sources. We present here results of real driving NO_x emissions of about 100 buses in three German cities.

The measurements are performed behind the vehicles in the diluted emission plume in a following car based on the plume chasing (sniffer car) principle to observe the emission of many buses. We apply our newly developed NO_x / CO₂ ICAD mobile measurement system for these studies. From the ratios of measured NO_x to CO₂ concentrations in the plume the emission is calculated. By measuring with this method over several minutes reliable emission data can be derived. We also validate them to PEMS (Portable Emission Systems) measurements, which were directly performed at the tailpipe and found a very good agreement within 10%.

The results of our studies show a large range of emissions. Especially older buses show high emissions. EURO VI buses have in most cases very low emissions, but there are also some strong outliers. Interesting is that real driving emissions in urban areas of almost all EURO V buses are relatively high and not much lower than these of older buses. Thus real driving emission of buses in urban areas are very different to what was expected from the EURO emission norm. It is shown that a good quantification is necessary to identify the high NO_x-emitting buses within the bus fleet so that decision makers can first focus on the replacement of these buses.