

The Research on Diesel Bus Emissions in Ulaanbaatar City: Mongolia

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Abstract : To make the best decision on reducing harmful emissions from buses, we need to have a clear understanding of the current state of their actual emissions. The emissions from city buses running on high sulfur fuel, particularly particulate matter (PM) and nitrogen oxides (NOx) from the exhaust gases of conventional diesel engines, have been studied and measured with and without diesel particulate filter (DPF) in Ulaanbaatar city. The study was conducted by using the PEMS (Portable Emissions Measurement System) and gravimetric method in real traffic conditions. The obtained data were used to determine the actual emission rates and to evaluate the effectiveness of the selected particulate filters. Actual road and daily PM emissions from city buses were determined during the warm and cold seasons. A bus with an average daily mileage of 242 km was found to emit 166.155 g of PM into the city's atmosphere on average per day, with 141.3 g in summer and 175.8 g in winter. The actual PM of the city bus is 0.6866 g/km. The concentration of NOx in the exhaust gas averages 1410.94 ppm. The use of DPF reduced the exhaust gas opacity of 24 buses by an average of 97% and filtered a total of 340.4 kg of soot from these buses over a period of six months. Retrofitting an old conventional diesel engine with cassette-type silicon carbide (SiC) DPF, despite the laboriousness of cleaning, can significantly reduce particulate matter emissions. Innovation: First comprehensive road PM and NOx emission dataset and actual road emissions from public buses have been identified. PM and NOx mathematical model equations have been estimated as a function of the bus technical speed and engine revolution with and without DPF.

Keywords : conventional diesel, silicon carbide, real-time onboard measurements, particulate matter, diesel retrofit, fuel sulphur

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