

QUANTIFICATION OF THE ENVIRONMENTAL IMPACT IN THE CITY OF MADRID DEPENDING ON TECHNICAL MEASURES APPLIED TO BUS FLEET

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A2: Tools for emission reduction, zero emission in the future

ABSTRACT

In the present article is analyzed a methodology to model the emissions pollutant from urban buses in the city of Madrid. The target is to represent by means of a computer model the evaluation of the fuel consumption and the pollutant emissions produced by the urban collective transport, depending on the vehicles characteristics, operation conditions and fuel used. This model is calibrated with respect to the tests results carried out in a set of driving cycles by the Municipal Company of Transport of Madrid (EMT). Knowing the slope, weight and average speed of each vehicle for every route or driving cycle, the fuel consumption and the emissions that the vehicle generates are derived.

With the purpose of obtaining repeatability and similar operating conditions, the test procedure consisted in making each bus travel along the same route several times a day, on different days at the same hour and the same driver.

The information of emissions and fuel consumption are obtained of tests "on board" realized in buses of the fleet of the EMT. Exhaust emissions have been measured using the Horiba OBS 2200 onboard emission measurement system. It can acquire data under real-driving conditions of vehicle use. Such data are instantaneous and accumulated CO, CO₂, THC and NO_x emissions, fuel consumption. Because of the set of gas analyzers, it provides real mass emission results (g/s) and instantaneous emissions (expressed as a % or ppm, depending on the gases involved). The equipment also includes sensors for measuring humidity and ambient temperature and a GPS system for measuring the speed and position at every instant. It should be noted that this speed measurement has been verified using a Correvit L-CE- non-contact speed sensor and it was found that deviations were always lower than 1 km/h. It also has a laptop with specific software for system control, data collection and display and for generating test result reports. For particulates matter, the diesel exhaust particulate onboard analyser OPMS-04 equipment of Maha was used.

The model allows to simulate the quantification of emission on having changed the type of vehicle for different lines of route, and this way to obtain information of the impact of the technologies and fuels in the urban area.