

Testing the noise emission of individual motor vehicles in the Brussels-Capital Region

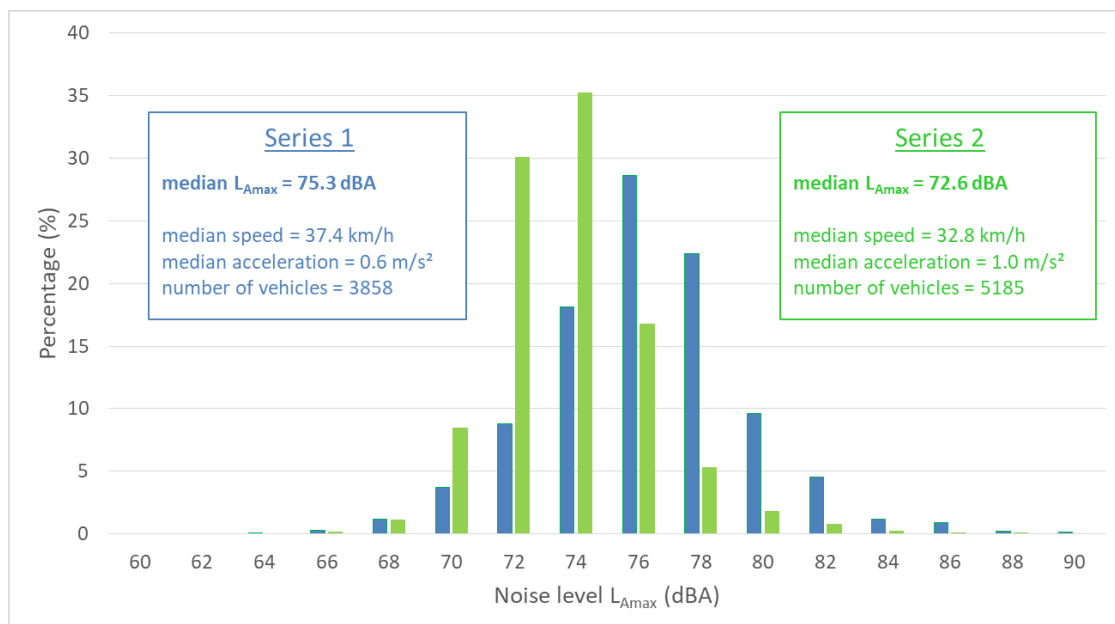
In autumn 2020, The Real Urban Emissions Initiative (TRUE) tested the air pollutant emissions of several thousand vehicles in the Brussels-Capital Region. At the same time, Brussels Environment carried out sound level measurements when some of these vehicles passed by, when accelerating and when driving at a moderate speed.

CONTEXT

Noise emitted by road traffic is the main source of noise pollution in the Brussels-Capital Region, exposing nearly 64% of the population to an **average 24-hour noise level** (L_{den}) greater than 55 dBA, a level likely to cause significant discomfort. Since 2018, the WHO strongly recommended reducing road traffic noise levels to below 53 dBA L_{den} given the link between noise levels above this value and adverse health effects. It is therefore important to monitor road traffic noise.

What makes this campaign so interesting is the data it provides about each vehicle measured: speed and acceleration, but also model, type of vehicle, year of first registration, etc., which makes these noise measurements unprecedented. They were performed at the exit of a roundabout (2 series), under acceleration and at a moderate speed, at a distance of 5 m from the passing vehicles. The analyses were performed on the maximum sound level measured for each passing vehicle (L_{Amax}).

MAIN RESULTS

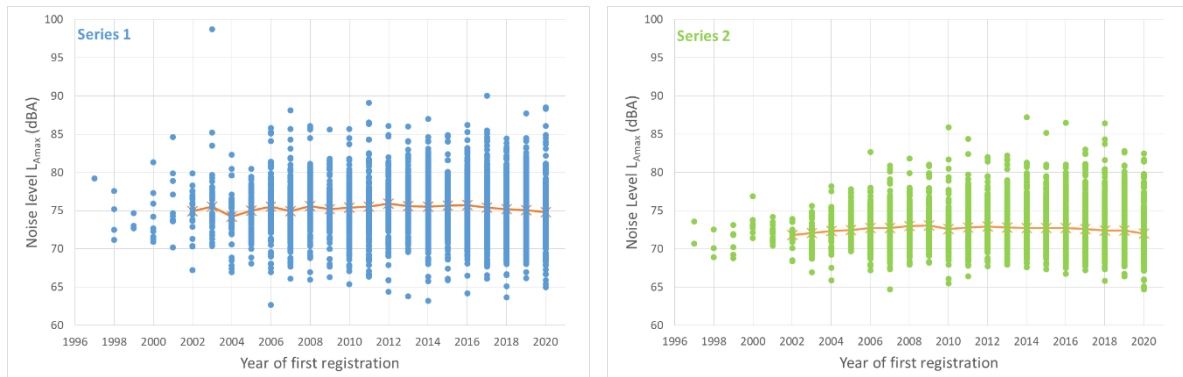


Percentage distributions of the maximum sound levels of passing vehicles by 2 dBA class. The measurements were performed in autumn 2020 at two different roundabout exits.

- The median L_{Amax} for series 1 is 75.3 dBA and 90% of the passages are between 70 and 81 dBA. It is 72.6 dBA for series 2 and 90% of the passages are between 69 and 77 dBA. On the noise level scale, 70 dBA is considered noisy, 80 dBA very noisy.
- Series 1 is characterised by higher speeds and lower accelerations than series 2. The L_{Amax} level of this series 1 is mainly correlated with vehicle speed and is characteristic of rolling noise (noise produced by tyre-road contact). Series 2 is characterised by

lower speeds and higher accelerations than series 1. The L_{Amax} level of this series 2 is mainly correlated with acceleration, so the main noise is engine noise.

- Consequently, speed reduction is effective in reducing vehicle noise unless it is below 30 km/h, at which speed acceleration, and therefore driving behaviour, mainly influences the noise produced. Enforcing a 30 km/h zone throughout the Brussels-Capital Region is therefore justified from the point of view of noise emissions.



Noise levels L_{Amax} as a function of the year of first registration of the vehicles for the two series of measurements. The linked orange crosses represent the median L_{Amax} for each year.

- The year of first registration or the Euro standard of the vehicles on the road in Brussels has no influence on the noise emitted, either with regard to rolling noise (series 1) or engine noise (series 2). The difference between the different median levels per year of first registration is at most 1 dBA (imperceptible to a listener). The evolution of vehicles over the years, which has a proven effect on the reduction of air pollutant emissions, does not go hand in hand with a reduction in noise levels.
- An analysis by vehicle category shows that vans and trucks (N1) have emissions that are similar to or 1 dBA higher than passenger cars (M1 category). Motorbikes (L3e) are 3 to 4 dBA higher than cars, trucks over 3.5 tonnes (N2 and N3) 7 to 8 dBA higher. At the same time, there is a clear increase in the evolution of noise levels in line with the power of the vehicles or with their unladen mass.
- Petrol vehicles have slightly lower levels than diesel vehicles (around 1 dBA). Further measurements are needed to show differences in emission levels for electric vehicles, which were under-represented in this measurement campaign. However, the first analyses show that electric sports vehicles are noisier than the average diesel or petrol vehicle.

Publication details

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https://document.environnement.brussels/opac_css/electfile/RAP_20220111_BruitRemoteSensing.pdf

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