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Low emission zones may need complementary local traffic policies

Low emission zones (LEZs) that restrict old vehicles in city centres may need implementation in combination with other traffic policies to have greater impacts on air quality, according to new research. A study that measured emission levels before and after the introduction of LEZs in five Dutch cities indicated that air pollution concentrations were reduced but not to a statistically significant level.

EU air quality standards have set targets for several pollutants; amongst the most important are nitrogen dioxide, PM_{10} and $PM_{2.5}$. In order to reach these standards, several policy measures have been taken, including low emission zones (LEZ) which limit or ban certain types of vehicles in city centres. Over 150 cities in nine EU Member States have implemented LEZs, but there has been little evaluation of their actual effects.

The study investigated the effectiveness of LEZs targeted at heavy duty vehicles in five Dutch cities on air quality. Measurements of PM_{10}, $PM_{2.5}$, soot, NO_2 and NO_x were taken simultaneously in Amsterdam, The Hague, Utrecht, Den Bosch and Tilburg, before (2008) and two years after (2010) the implementation of LEZs. Air samples were taken regularly at major streets within the LEZs where traffic was high, and in more general urban locations, also within the LEZs but away from heavy traffic. These were compared to samples from suburban areas where no local traffic policy had been implemented. The results were adjusted to account for differences in wind speed between the two sampling periods.

All pollutant concentrations were lower in 2010 than in 2008 in all the LEZs. The drop in concentrations of soot, NO_2 and NO_x was not significantly different between major streets and suburban areas, indicating there may have been a general decrease for these pollutants that can not be attributed solely to the introduction of the LEZ. These three pollutants are generally strongly linked to traffic intensity. In one street, there were striking differences in the concentrations of soot (41% reduction), NO_2 (25% reduction) and NO_x between 2008 and 2010. This area had experienced other traffic reduction policies, as well as the LEZ, indicating that perhaps it is a combination of measures that produces the biggest impact on these pollutants.

The reduction in $PM_{2.5}$ concentrations was significantly different between urban streets and suburban streets: urban streets experienced, on average, a 31% reduction in $PM_{2.5}$, whilst suburban areas experienced a 20% reduction. Since the effect was not restricted to busy streets, but also seen on more general urban areas away from traffic, the study proposed that this may not be solely the result of the LEZs. For example, the reductions could have been caused by cuts in non-traffic $PM_{2.5}$ emissions, such as those from industrial processes and power plants.

The study suggests several explanations for the finding that the impact of the LEZs was not as great as expected. For example, the zones may be too small and affect too few vehicles. In addition, the increase in new diesel cars could have outweighed any positive impacts by causing a rise in some emissions, especially soot. The recent economic crisis could also have caused a general fall in emissions, making it harder to detect a LEZ-related change. LEZs do reduce pollutants but it would appear that they may need to be larger or more stringent and implemented alongside local complementary policies, such as traffic reduction, to reduce pollutant emissions to a greater level.