

Abstract

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Topic: Impact analysis of low emission zones

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Currently in Germany there are about 50 environmental zones, most of which reached the lowest emission level (fourth stage). In these zones only vehicles with green stickers are allowed to drive. Despite the fact that the benefits of environmental zones have not been examined in detail yet, new environmental zones are being established such as in Mainz and Wiesbaden. In many cities of Germany the particulate matter emission is still above the 39th BImSchV limit. Darmstadt is among the cities where the emission values have exceeded this limit for several years in row. For his reason, the city is currently discussing the introduction of a low-emission environmental zone.

The present work carries out an analysis of the impact of environmental zones. The aim is to get an overview of nearly all environmental zones and not to evaluate only the environmental zone of a single city. Most studies that investigate the effect of environmental zones focus only on one town or region. This approach has the advantage of accounting for regional factors, but is not suitable for drawing general conclusions about the effect of environmental zones.

The effect of environmental zones is difficult to estimate because there are many factors that affect the particulate measurements. These factors, such as traffic, construction, weather, have not been all considered in many existing studies. Due to limited time, the present work also cannot take in consideration all factors, which makes the evaluation of the effect difficult.

In analyzing the effect of the environmental zones, various methods have been employed. As a first step, the general trend of particulate matter emission was investigated. This analysis did not provide conclusive results on the effect of environmental zones. Therefore, a second analysis, using the introduction time of the environmental zone was performed. Here, when considering the changes before and after the introduction of the environmental zone, the first positive results were observed. The analysis could not determine a positive trend between remote and near-traffic stations for all introduction time points. Another approach was to use the standard deviation for creating ore groups in order to compare the values better. In this analysis, the results of the first analysis were confirmed. As a last analysis, the values of particulate matter emissions were adjusted to those of different reference stations. Here, values of stations inside and outside the environmental ones were divided by the values of rural remote reference stations. These adjusted values were compared again for the times before and after the introduction of environmental zones. The results confirmed those of previous analyses. Finally, the results were further investigated by significance tests.

The results indicate a positive trend for the effect of environmental impact zones on articulate matter emission. However the trend could not be confirmed by significance tests. The data suggests an improvement of the particulate matter emission with the change of annual means and daily limit exceedances, but this does not reach significance.

The results of the present study indicate that the introduction of environmental zones has no significant positive effect on the environment. As many contributing factors were not considered in this study, further studies that include these factors are required in order to better estimate the effect of environmental zones.