The turn of the 20th and 21st centuries brought a surge in environmental awareness, which spread across many aspects of socio-economic life. This included endeavours to reduce the effects of diversity and distance decay on geographical space. As transport is one of the main sources of emissions, it ranks high on the pro-environmental agenda. The importance of reducing transport-related emissions in the highly susceptible central areas of large cities is of great significance due to the extremely intensive spatial mobility that occurs there. For this reason, more and more local authorities are introducing low-emission zones. Since they are a novel component of local transport systems in Poland, their impact on other constituents of these systems (including the population) remains undocumented in Poland.

The first issue the applicants undertake to address is to identify and determine the changes in the transport behaviour of the population in selected large cities in Poland that are a result of the establishment of low-emission zones within their boundaries. These changes are aimed at reducing the negative impact of transport-related emissions on health and the environment. The second issue is to identify and demonstrate the specific properties of the cities chosen and their low-emission zones that affect transport behaviour of the population. Information on population mobility in the cities will come from three main sources of data. The first will be the results of a proposed questionnaire survey on the transport behaviour of the inhabitants of the selected cities (with particular focus on the implementation of low-emission zones). The second will be data from induction loops/automatic number-plate recognition/vehicle camera recorders which are part of the intelligent transport systems operating within these cities. The third source will be data on road traffic and the occupancy of public transport vehicles in selected cities. The data from these sources will provide relevant information on changes in mobility in the areas concerned, with a high level of accuracy, detail and comprehensiveness. Any shortcomings of these databases as regards research into transport behaviour (including trip motivations) are remedied by the planned questionnaire survey and the in-depth interviews to be conducted with representatives of local authorities that manage urban transport systems. These fully complementary sources of information will combine to ensure the achievement of the set scientific objectives of the project.

The study covers the following large cities in central and southern Poland: Krakow, Lodz, Rzeszow, Warsaw and Wroclaw. These were selected on the basis of both the availability of comprehensive data describing the performance of their urban transport systems, the modal split of the total number of trips (which is dominated by cars), and their inclusion (since 2022) among the 100 European cities receiving environmental support under the EU Mission: 'Climate-Neutral and Smart Cities'. These funds will be allocated to improve air quality, to provide safe and environmentally-friendly transport, to implement nature conservation measures, and to expand green spaces in the cities. This will be supported by NetZeroCities to bring together all key players, including residents, academic and business milieus, to introduce transformative processes and innovative actions aimed at achieving climate neutrality by 2030. In this sense project proposed here will bring invaluable insights into the effectiveness of the role of low-emission zones in the operation of cities.

The significance of the results of the project for the development of the social sciences, socio-economic geography and spatial economy cannot be overestimated as regards the role of transport behaviour studies for the planning and shaping of the transport system. Not only will they provide an objective picture of the status quo, but also allow the construction of more advanced analytical tools, including traffic models. In addition, these studies will supply the data needed for traffic forecasting and allow an insight into residents' expectations from the transport system, as well as bringing new information about the changes in the transport behaviour among residents of Krakow, Lodz, Rzeszow, Warsaw and Wroclaw, following the implementation of low-emission zones. Managing the development of transport so that it meets the real mobility needs of residents requires knowledge of their daily transport behaviour. It is reasonable to assume that this behaviour will change to a certain extent due to low-emission zones being introduced within the selected cities. An essential supplement to the set of quantitative data available in the literature so far (e.g., the spatial and temporal structure of vehicle traffic volumes) on the performance of the transport systems within the selected cities would be a survey conducted using a questionnaire interview. This will allow the researchers to investigate the motivations behind residents' mobility in space and time and for a given means of transport before and after the implementation of the new transport constraint, i.e., low-emission zones in cities.