Impact of congestion pricing schemes on costs and emissions of commercial fleets in urban areas

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Abstract

As urbanization increases, municipalities across the world have become aware of the negative impacts of road-based transportation, which include traffic congestion and air pollution. As a result, several cities have introduced tolling schemes to discourage vehicles from entering the inner city. However, little research has been done to examine the impact of tolling schemes on the routing of commercial fleets, especially on the resulting costs and emissions. In this study, we investigate a vehicle routing problem considering different congestion charge schemes for several city types.

We design comprehensive computational experiments to investigate whether different types of tolling schemes work in the way municipalities expect and what factors affect the performance of the congestion charge schemes. We compare the impact on a company's total costs, fuel usage (which drives emissions), and delivery tour plans. Our experimental results demonstrate that some congestion pricing schemes may even increase the emissions in the city center, and higher congestion charges may not necessarily lead to lower emissions.