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Evaluating Emission Reduction Due to a Proposed Light Rail Service: A Micro-Level Analysis

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Abstract : Carbon dioxide (CO₂) alongside other gas emissions in the atmosphere cause a greenhouse effect, resulting in an increase of the average temperature of the planet. Transportation vehicles are among the main contributors of CO₂ emission. Stationary vehicles with initiated motors produce more emissions than mobile ones. Intersections with traffic lights that force the vehicles to become stationary for a period of time produce more CO₂ pollution than other parts of the road. This paper focuses on analyzing the CO₂ produced by the traffic flow at Anzac Parade Road - Barker Street intersection in Sydney, Australia, before and after the implementation of Light rail transport (LRT). The data are gathered during the construction phase of the LRT by collecting the number of vehicles on each path of the intersection for 15 minutes during the evening rush hour of 1 week (6-7 pm, July 04-31, 2018) and then multiplied by 4 to calculate the flow of vehicles in 1 hour. For analyzing the data, the microscopic simulation software “VISSIM” has been used. Through the analysis, the traffic flow was processed in three stages: before and after implementation of light rail train, and one during the construction phase. Finally, the traffic results were input into another software called “EnViVer”, to calculate the amount of CO₂ during 1 h. The results showed that after the implementation of the light rail, CO₂ will drop by a minimum of 13%. This finding provides an evidence that light rail is a sustainable mode of transport.

Keywords : carbon dioxide, emission modeling, light rail, microscopic model, traffic flow
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