World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:16, No:07, 2022

Carbon Footprint of Road Project for Sustainable Development: Lessons Learnt from Traffic Management of a Developing Urban Centre

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Abstract : Road infrastructure plays a vital role in the economic activities of any economy. Besides derived benefits from these facilities, the utilization of extensive energy resources, fuels, and materials results in a negative impact on the environment in terms of carbon footprint; carbon footprint is the overall amount of greenhouse gas (GHG) generated from any action. However, this aspect of environmental impact from road structure is not seriously considered during such developments, thus undermining a critical factor of sustainable development, which usually remains unaddressed, especially in developing countries. The current work investigates the carbon footprint impact of a small road project (0.8 km, dual carriageway) initiated for traffic management in an urban centre. Life cycle assessment (LCA) with boundary conditions of cradle to the site has been adopted. The only construction phase of the life cycle has been assessed at this stage. An impact of 10 ktons-CO2 (6260 ton-CO2/km) has been assessed. The rigid pavement dominated the contributions as compared to a flexible component. Among the structural elements, the underpass works shared the major portion. Among the materials, the concrete and steel utilized for various structural elements resulted in more than 90% of the impact. The earth-moving equipment was dominant in operational carbon. The results have highlighted that road infrastructure projects pose serious threats to the environment during their construction and which need to be considered during the approval stages. This work provides a guideline for supporting sustainable development that could only be ensured when such endeavours are properly assessed by industry professionals and decide various alternative environmental conscious solutions for the future.

Keywords : construction waste management, kiloton, life cycle assessment, rigid pavement
Conference Title : ICWMT 2022 : International Conference on Waste Management and Technology
Conference Location : Istanbul, Türkiye
Conference Dates : July 28-29, 2022