Chapter 3
Sustainability and Environmental Impact of Urban Mobility:
Driving Green Transportation for the Future

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ABSTRACT

The availability of new opportunities and the constant growth of the megalopolis challenge advertisers' sustainable travel based on transport, the volume of which, according to experts, has become one of the main factors affecting greenhouse gas emissions, air pollution, and energy consumption. This chapter aims to cover a crucial area of research that focuses on city mobility concerning achieving and managing sustainability and its impacts on the environment. It covers the trend towards environmentally friendly means of transport, including EVs, hydrogen vehicles, and using green power in city transport. This chapter also addresses ITS concerns

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regarding traffic management, congestion, and energy use reduction efficiencies. Describing schemes such as smart infrastructure for green transport, energy-effective design, and zero carbon transport policies, this chapter offers perceptive scenarios on how cities may facilitate the transformation to sustainable low-emission transport systems with a vision for the global solution to climate change and improved environmental sustainability.

1. INTRODUCTION

Over the decades, urban structures similarly apply pressure on the need to establish competent and effective modes of transport. The environmental, economic, and social costs of traditional modes of transport have continued to grow and impose pressure on many cities globally through factors such as traffic congestion, air pollution, and greenhouse gas emissions (Fan et al., 2024). Such challenges empathically influence the quality of living in urban areas, the supply of fresh air, times of climate change, global warming, and resource depletion. Ensuring sustainable urban mobility is about identifying environmentally friendly transportation systems that will provide adequate and, more importantly, economical and easily accessible means of transport to the users within the city. This section will explain the rationale for moving towards sustainable urban mobility, stressing improving cities' sustainability, properly understood as the long-term and cumulative ability of individuals, systems, and the environment to support and meet people's needs, along with emissions reduction and upgraded quality of life.

1.1 Environmental Challenges in Urban Transportation

Transportation systems, particularly road transport, are one of the leading human-influenced causes of environmental deterioration, contributing approximately 23% of the total energy-related carbon dioxide emissions globally. High use of internal combustion engine vehicles causes air pollution, and quantities such as NO_2, SO_2, and CO_2 affect humans and the environment (Borchers et al., 2024). Secondly, road congestion is rife, leading to more fuel use, gas emissions, and waste resources. Environmental pollution also results from extended urban development coupled with small, undeveloped public means of transport. In this section, the following environmental issues specific to urban transportation will be expounded: Air quality deterioration, resource utilization, and the overall effects of climate change.