

Investigating electric garbage trucks use for waste collection for urban and rural communities

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1. Introduction

A current trend in the automotive industry shows the growing production of electric vehicles. It has become also an important change in transportation policy for various countries. In many cities, local authorities restrict access to vehicles that do not meet emission standards (European Commission 2016). Some large conurbations established clean air zones (Glazener and Khreis, 2019). It is one of the reasons to modernize a fleet of vehicles by various companies. Electric-powered commercial vehicles are another part of the expansion in the market for automobile manufacturers. One of the possible use of electric commercial vehicles is garbage trucks. Several companies have already offered newly manufactured models of electric trucks for service in waste collection. They are not yet as popular as buses but the growing interests of the waste collection companies together with the obligation of reducing pollution levels in urban areas requires an analysis of the possibility of using these vehicles in waste collections (Cunanan et al., 2021; Ewert et al., 2020).

2. Materials and methods

This study focuses on the analysis of using electric vehicles for various categories of waste. Depending on the number of categories and waste collection schedules it is necessary to assign suitable vehicles for the collection area both in urban and rural areas. The analysis included in our research will include technical, environmental, and economic factors of the replacement of diesel-powered garbage trucks compared to electric trucks. There are different approaches for the collection of waste in rural and urban communities, especially regarding collection methods and schedules. As a result, there are significant variations in the volume of collected waste and transportation costs. The collection area covers single-family houses with long driving distances and densely populated areas with high blocks with flats. For each community, the collection simulation by an electric vehicle is necessary taking into consideration operational parameters including power demand, the number of stops, and container handling operations (lifting, emptying, and lowering). Some categories of waste require small capacity collection vehicles. In this case, a much bigger variety of vehicles can be selected by the collection companies as the manufacturers offer more vehicles' models. SWOT analysis will be provided to indicate the best solutions for the waste collection companies in transferring from a diesel-powered fleet of vehicles to electric vehicles.

3. Discussion

The results of the study will be helpful for waste collection companies and local administration for consideration of replacement of garbage trucks by electric vehicles. It would require some investments not only by purchasing the vehicles but also by setting up charging stations in the waste collection companies' bases. The conclusions highlight advantages and potential issues of electric garbage truck use in waste collections.

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