Assessment of the potential of electric vehicles and charging strategies to meet urban mobility requirements

Abstract:
To integrate electromobility into modern urban mobility, it is necessary to assess the usability and potential of hybrid, plug-in and battery electric vehicles (BEVs) to meet urban mobility requirements, as well as their impact on electric distribution grid. Despite the progress that has been made in this field over the last decade, many technical issues still need to be addressed. This paper presents the results of a large-scale analysis of real-world driving data from activity databases, anonymously collected by Global Positioning System devices installed on conventional fuel vehicles. These data were processed to derive whether different types of BEVs and recharging strategies can meet urban mobility needs. The impact of the electric energy demand on the grid from a partially electrified urban fleet has also been addressed. The study involves approximately 28,000 vehicles, 4.5 million trips and 36 million kilometres in the Italian provinces of Modena and Firenze, monitored over a one-month period (i.e. May 2011). The results can contribute to assess the future integration of the electromobility in urban environment, their impact on the electric energy demand profile as well as possible scenarios for future European transport policies.

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