Optimal Siting For Electric Vehicle Charging Stations in Waterloo Region Using Trip Success Ratio

Yassir Alhazmi and Magdy Salama
University of Waterloo
Canada
yalhazmi@uwaterloo.ca
m.salama@uwaterloo.ca

Abstract

This paper proposes a novel model for siting Plug–in Electric Vehicles (PEVs) Charging Stations (CSs) optimally in the network. The model considers Trip Success Ratio (TSR) in order to enhance the CSs accessibility by PEVs' drivers. The diversity of usage and different drivers' habits are considered in the presented model. The siting model has two stages: Charging Station Service Range (CSSR) stage and Optimal Siting CSs stage. In the first stage, the service range of charging stations has been estimated using TSR with the consideration of the uncertainty of trips distances (In – City) and the uncertainty in Remaining of Electric Range (RER) of PEVs. The estimated CSSR is utilized in the Siting CSs stage in order to optimize the location set of CSs that covering the network of Waterloo Region with a certain TSR level guaranteed. The siting problem has been formulated as Maximum Covering Location Problem (MCLP) in order to allocate CSs in the network of Waterloo Region optimally.
Keywords—Siting Charging Station; Plug–in Electric Vehicles; Service Range; Trip Success Ratio

Keywords
Modeling, simulation, repacking, wheel