

## **Demand-side management strategy in a smart home using electric vehicle and hybrid renewable energy system**

Abstract. The residential area represents a sector that consumes more electricity especially with the rapid urban growth and the transition towards the automation and electrification of several daily activities of human beings, namely: urban mobility and the residents' indoor comfort. As a result, meeting this increased demand requires a proportional rise in fuel use to generate energy. This type of conventional power production has significant impacts on the environment. The eco-friendly alternative is the use of renewable energies in its distributed form on buildings. However, this solution gives rise to some issues related to energy management especially with the penetration of a new domestic device, namely: the plug-in electric vehicle. For this purpose, we propose a management system for a future household equipped with controllable electric loads and an electric vehicle equipped with a PV-Wind-Battery hybrid renewable system connected to the national grid. The proposed management system is based on a linear programming model with non-linear constraints solved with MATLAB toolboxes. The simulation is based on a database of meteorological conditions resulting from TRNSYS and processed to achieve a frequency of one hour. The system decisions provide switch control states of the connection architecture as well as the variation according to the V2H (vehicle to home), H2V (home to vehicle) and involved G2V (grid to vehicle) scenarios when grid comes into play during H2V mode.