

ELECTRIC VEHICLES AND SMART GRID INTEGRATION

**Dr. Massimo CARUSO, Department of Engineering,
University of Palermo, Italy.
Email:Massimo.caruso16@unipa.it**

ICSMARTGRID 2020
8TH INTERNATIONAL
CONFERENCE ON SMART
GRID

June, 2020,
Paris/France

ABSTRACT

It can be stated that the sustainable development of our planet is considerably related to a significant and constant reduction of environmental pollution in the next years. In this perspective, the electrification of the transportation sector represents a valuable solution to the global climate change challenge, decreasing the Greenhouse Gas (GHG) emissions from fossil fuels.

On the other hand, the Electric Vehicles (EVs) are characterized by a big potential on serving the electric grid as independent distributed energy source, delivering the energy stored in their batteries in order to provide ancillary services, such as integration of fluctuating renewable sources and peak-shaving power. Coordinated charging and discharging of electric vehicles is receiving a considerable attention during the last years, leading to the concepts of Vehicle-to-Grid (V2G) and Grid-to-Vehicle (G2V).

In this context, the aim of this tutorial is to provide the audience with the actual scenario and the future perspective on the interaction between electric vehicles and smart grids.

More in detail, the tutorial is structured as follows:

The first part will be focused on the actual technological innovation of electric vehicles in terms of equipped sensors and actuators towards a more efficient data analysis and management for the smart grid integration. These innovative paradigms will also address signal processing and human-machine interaction technologies to design safety and partially autonomous vehicles.

The second part of the tutorial will examine the actual and future possibilities on the EV performance improvement regarding their electric motor and drive system. An extensive analysis on the typologies of motor-drive systems adopted in the automotive sector will be provided, focusing, then, the attention on the integrated real-time control algorithms capable of enhancing the performance of the whole drive for a more efficient V2G interaction.

Finally, the tutorial will give particular attention to the challenges in terms of both standardization and performance improvement of EV charging stations for their smart grid integration, highlighting the aspects related to smart and fast EV charging infrastructures and their optimal management.