

# Fast Charging and Smart Charging Tests for Electric Vehicles Batteries Using Renewable Energy - DTU Orbit (09/11/2017)

## Fast Charging and Smart Charging Tests for Electric Vehicles Batteries Using Renewable Energy

Electric Vehicles (EV) technologies are still relatively new and under strong development. Although some standardized solutions are being promoted and becoming a new trend, there is an outstanding need for common platforms and sharing of knowledge and core technologies. This paper presents the development of a test platform, including three Li-ion batteries designed for EV applications, and three associated bi-directional power converters, for testing impacts on different advanced loadings of EV batteries. Different charging algorithms/profiles have been tested, including constant current and power, and forced and pulsed power. The aim of the tests has been to study the impact of smart charging and fast charging on the power system, on the battery state of health and degradation, and to find out the limitations of the batteries for a Smart Grid. The paper outlines the advantages and disadvantages of both tests in terms of regulation of the aggregated local power, power capacity and the power exchange with the grid. The smart charging tests performed have demonstrated that even with a simple control algorithm, without any forecasting, it is possible to provide the required charging and at the same time the power system services, reducing the peak power and the energy losses in the power connection line of the power exchange with the national grid.

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