

**Title:** The Electric Vehicle Integration into the Power System: An Application to the Portuguese Case

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**Abstract:** Electric vehicles (EV) offer a great potential to address the integration of renewable energy sources (RES) in the power grid, and thus reduce the dependence on oil as well as the greenhouse gases (GHG) emissions. The high share of wind energy in the Portuguese energy mix expected for 2020 can lead to eventual curtailment, especially during the winter when high levels of hydro generation occur. In this paper a methodology based on a unit commitment and economic dispatch is implemented, and a hydro-thermal dispatch is performed in order to evaluate the impact of the EVs integration into the grid. Results show that the considered 10 % penetration of EVs in the Portuguese fleet would increase load in 3 % and would not integrate a significant amount of wind energy because curtailment is already reduced in the absence of EVs. According to the results, the EV is charged mostly with thermal generation and the associated emissions are much higher than if they were calculated based on the generation mix.

**Author Keywords:** CO2 emissions; Electric vehicle; Renewable integration; Power grids; Wind energy; Economic dispatch

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