

Direct load control decision model for aggregated EV charging points

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Abstract— This paper details a decision model to implement Direct Load Control (DLC) on battery charging processes at Electric Vehicle Charging Points located at parking areas. The programming model combines optimally three types of energy management decisions: Grid to Vehicle charges, Vehicle to Grid discharges and novel Vehicle to Vehicle energy exchanges. The objective function maximizes the net energy supplied to batteries minimizing simultaneously the global energy cost. A 50 plug-in vehicle park case is analyzed for three possible mobility patterns: household, commercial and mixed. Outputs from the DLC model are compared with the ones using a dumb charging policy from the service quality and economic points of view. Finally, a sensitivity analysis has been done to evaluate the economic impact of the Depth of Discharge condition to preserve battery lifecycle of Electric Vehicles.

Index Terms— Direct Load Control, Electric Vehicle Batteries, Charging Points, Vehicle to Grid, Grid to Vehicle, Vehicle to Vehicle

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