FORECAST THE CHARGING POWER DEMAND FOR AN ELECTRIC VEHICLE

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Abstract

A part of the project “Smart City Rheintal” aims to enhance the share of self-consumed energy. Renewables, mostly photovoltaic, are used to cover the demand of the electric vehicle infrastructure. In order to attain this objective it is necessary to forecast the demand of the electric vehicles. Furthermore, the energy generation has to be forecasted. This forecast is already provided by an external service provider. The load curve of the electric vehicle (EV) is generated by historical charging values. The aim of this work is to develop a method to predict the energy demand of one EV. The forecast is done for the upcoming day. A tool by the company *“metalogic German company in Munich with a software to model forecasting equations, www.metalogic.de”* is being used to achieve a reliable forecast. This tool offers a series of mathematical instruments to build up a model. The work demonstrates that a direct definition of the energy needs is not possible. Hence, a two-stage work is required. The first stage defines a model of a linear regression equation of the State of Charge (SoC) of the vehicles battery. In the second step a model for the energy forecast by using the results of the first step as an influence value is defined.

Introduction

One of the challenges in the project “Smart City Rheintal” (SCR) is the maximization of self-consumption of renewable energy. To reach that an active demand side management is needed. Therefore an application controls and shifts the energy consumption of an electric vehicle (EV). To facilitate self-consumption knowledge about consumer behavior has to be gathered. One important part is the behavior of e-cars user. Especially charging times – start, end, duration – charged energy and energy consumption (demand) are essential key figures. To get this information it is necessary to analyze the charging power of a representative EV. With knowledge of charging power demand of an e-car it is possible to see if the forecasted energy generation will be enough to cover the energy needs of the EV for the whole intraday (not part of this work). This work will be the basis to know more about the consumption of energy of one e-car, and how mathematical models can predict the consumption of it

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