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Masterarbeit:

Auswirkungen von Photovoltaik und Elektromobilität auf den Strombedarf eines durchschnittlichen Haushalts aus dem Stromnetz im Bezirk Hermagor

Modellierung unterschiedlicher Szenarien

Abstract

This master thesis discusses the impact on the electricity grid by an average household including a photovoltaic system and an electric car in the district Hermagor. The starting points of the four scenarios are a standardized load profile for a household and the power consumption of the electric car of an average commuter in the district Hermagor. The modeling is performed in each case for a poor, an average, and an improved photovoltaic-yield-week in winter and in summer from a 5 kWp photovoltaic system.

In scenario 1 only one single battery charge and discharge limit is defined. Therefore, after most trips in all weeks battery charge is essential. The resulting peak load of the grid is more than three and a half times greater than the largest current peak of the household. These peak loads can be largely avoided by the introduction of four charge and discharge limits and the possibility of night loading in scenario 2. Here, the charging of the battery happens in a time of low power demand of the household at a generally constant power from the grid. Concerning days with an average photovoltaic yield the possibility of breaking the current peaks of the household using electricity from the battery leads to a further reduction in system load. Due to two additional trips during the lunch break in scenario 3 the compensation feasibility of photovoltaic output and power requirements of the household is smaller regarding to the other scenarios. Recording to the modelling, scenario 4 shows the highest compensation feasibility, because there is no car driving. Scenario 3 shows the highest power requirement, while in scenario 4 the requirement from the grid is low.

In general, the higher the daily photovoltaic energy yields, the less power is needed from the grid. The lower the daily mileage of electric car and the shorter the connection-time car to electricity grid, the greater is the compensation feasibility of photovoltaic output and power requirements of the household.