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Balanced Priority Charging Put Into Practice for an E-Mobility Fleet of a Regional Council

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Summary

For the successful ramp-up of electromobility, a sufficient number of charging points with adequate charging power must be made available at all times. When setting up the charging infrastructure in practice, the question always arises of how many charging points are needed and how much charging power must be made available. A charging point could be deployed at each parking lot and reserve its required power at the grid connection point. However, the grid connection capacity is often limited by existing operating resources and could only be expanded with great efforts and disproportionately high costs. In addition, high grid fees would be incurred during operation.

To avoid an expensive expansion of the grid connection as well as high grid charges, charging management solutions are used and highly necessary/recommended. These solutions limit the charging capacities of individual charging points according to a predefined strategy. The strategies commonly used in the available solutions on the market have various advantages and disadvantages. For example, while they usually require either no or little information about the vehicles to be charged, they may discriminate vehicles or be unable to provide the needed charging energies by the time of departure.

The Parkraumgesellschaft Baden-Württemberg mbH manages a large number of parking lots and was faced with the described issue in one of their underground car park when expanding the supply of charging infrastructure for the Karlsruhe Regional Council. Since the enlargement of the grid connection point was not a valid option, the available capacity has to be utilized optimally without investing in a battery storage system or limiting the charging capacity per charging point. In addition, it should be ensured that vehicles of the Karlsruhe Regional Council have charged sufficient energy for the planned trips.

To solve these challenges, the ZSW developed an optimization-based charging management system in the "eLISA-BW" project funded by Baden-Württemberg's Ministry of the Environment, Climate Protection and the Energy Sector. In consideration of the information of the fleet booking system, the charging management provides the backend of the charging infrastructure with an optimized charging schedule.

This software solution is supposed to be presented to an interested audience. The advantages compared to other charging strategies as well as possible added value for third parties such as grid operators shall also be shown. The utilization of the transformer, to which the underground car park is connected, was also investigated.