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25 years of experience with Park&Charge charging stations

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Summary

Since 1992 a system of charging stations with a lump sum billing system has been established by drivers and non-profit organisations in Switzerland and soon also in Germany and Austria. In Germany the German Solarcar Association BSM, today national member of the AVERE, has been establishing the system. Main elements are the cheap wall mounted or standalone boxes with various sockets, the mechanical key and the label for the windshield of the electric vehicle. This reliable system can also allow the cheap introduction of electric vehicles in other countries.

Keywords: charging, efficiency, fast charging, infrastructure, sustainability

1 Introduction

In 1992 the author worked together with Prof. Dietrich Naunin, former president of DGES, the former national German section of AVERE, to write a paper for the German Ministry of Transport (BMV) about charging stations. Together with economic expert Stephan Möritz they developed a billing system with lump sum.

Soon after this they discovered that there is already a similar system in Switzerland with the name of "Park&Charge". This is a cheap system for the drivers of electric vehicles to reduce the cost of introducing Battery Electric Vehicles BEV into the market.

The elements of "Park&Charge" are the charging stations, the key KABA 20 from Switzerland and the yearly label for the windshield.

The German group visited the inventor Christian Leu, made an agreement and took the first 3 charging stations to Germany. The first German "Park&Charge"-station was inaugurated at Bosch-Station Haberkorn in Bielefeld.

Figure 1: First German “Park&Charge”-Station in Bielefeld with solar energy and lightweight vehicles

Figure 2: Wallbox charging station of the first years with CEE 400V-socket (red)

Figure 3: Park&Charge-Charging station from emco (design: Johanna Tiffe, form:f)

2 Manager of charging stations

The charging stations are bought by a “manager” of the charging station e.g. a hotel or a shop. They make the electric installation and care about a 24/7 availability. They offer the electric energy for free and get a label for their own vehicle for free every year (value: 50 euro). With the yearly label for free and the mechanical key of his own PuC-station, a station manager has access to all European Park&Charge-stations for his own car. The location is introduced into a map in the internet, e.g. lemnet.org.

3 Users of electric vehicles

The user orders the key for a deposit of about 50 Euro. They will get back this amount when the key is sent back. This deposit will be invested in renewable energies for the time of the “membership”. Every year he will get a new label for the windshield of his electric vehicle. The price varies according to the vehicle category, e.g.: Euro 50 for a passenger car, Euro 10 for a pedelec/electric bike. He can charge as much as he wants on every PuC-charging station.

Figure 4: Mechanical key KABA20 for all European Park&Charge-stations

Figure 5: Label for the windshield of the electric vehicle

4 Most economic public charging stations in the world?

The yearly cost for the label is 50 Euros. For this amount about 180 kWh can be paid (0.30 Euro/kWh). With 180 kWh a typical car can drive 1.000 km (18 kWh/100 km).

5 Experiences

After more than 25 years of experience with this kind of charging stations, we can learn:

… nobody that has no electric socket at home or at least at the working place will buy an electric car,

… that about 20% of the yearly energy consumption is charged in the public area, 80% at home,

… if people with an electric car live near a PuC-station, and want to charge there instead of "at home", they need an special agreement with the manager of this charging station,

… if a charging station is located in an very attractive area (e.g. city centre), a lot of people want to charge there without buying something at the shop of the manager of the charging station, maybe they stay longer than necessary to get back home, maybe they charge although they do not need to.

6 The future

When Park&Charge was invented, electric vehicles were typically equipped with lead batteries. The amount of energy to charge the battery was about 0.5-1 Euro per hour (e.g. 3 kWh). With a TYP2-Plug with a power of 22 kW in one hour electric energy for 7 Euros can be charged.

Is this the value, a manager of a charging station wants to offer for free to his customer?

Figure 6: New model with TYP2-socket from Park&Charge e.V. in Germany

Questions to be answered:

Do managers of charging stations want to pay this amount to get a customer?
Can the lump sum billing be kept?
Will the power be limited?
Is there a need for TYP2-sockets or even fast charging stations in the Park&Charge-system?

Acknowledgements

The system Park&Charge was developed by a lot of people in companies or non-profit-organisations in Switzerland, Germany and Austria. We should thank them all for their dedication for this tool to promote the use of electric vehicles, and especially efficient electric vehicles with low energy consumption per kilometre.

Author

Andreas Manthey studied vehicle engineering at Technical University of Berlin, was awarded with the European Solar Prize 1994 of the European Commission and is working on the topics of electric vehicles and renewable energies since 1985. Since 1992 he was responsible for the German part of the charging station network “Park&Charge”.

Today he teaches electric energy at the Technical University of Berlin, Institute for vocational studies. He works and makes seminars especially on electric (lightweight) vehicles, renewable energies and charging infrastructure.