Position Paper of Charging Interface Initiative e.V.

Mission Statement: Grid Integration

2018-12-11

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Introduction

CharIN is dedicated to develop and establish a global charging system, as the standard for charging Battery Electric Vehicles (BEVs) of all kinds.

Therefore, CharIN's goal is developing and establishing the Combined Charging System (CCS) as the global standard for charging battery powered electric vehicles (BEVs). CCS is maintained to be upward and downward compatible, thus guaranteeing investment security in charging infrastructure and cross-border compatibility of charging systems.

One of the primary aims of CharIN is to draw up requirements for the evolution of charging-related standards. For this reason, the focus group Grid Integration

- is identifying technical issues,
- is harmonizing approaches between the involved industries,
- is evaluating technical and economical potentials

and as a result, is defining consolidated cross industry and global statements and requirements in the field of grid integration of e-mobility, while keeping the end users view in mind.

The goal of this paper is to illustrate the position of CharIN towards grid integration and to provide an outlook for future developments.

Objectives for grid integration

The energy network will face three major challenges in the years to come:

a) the increasing decentralized production of energy from renewable sources (as opposed to energy production in large central power plants)

b) the balancing of volatile renewable energy production and grid capacities and energy demands

c) increasing numbers of BEVs (of all kinds) and charging of them at locations where the grid was designed for previously much lower energy demand (e.g. in residential areas)

While these challenges can be solved only partly by conventional grid expansion, this requires major investments in the electrical infrastructure and digitalization which would take considerable time; furthermore, short-term solutions for optimal utilization and the opportunity to use as much renewable energy as possible, are needed. BEV owners on the other hand can - while having the principle controllability by the DSO's load management installed – take part in the flexibility market for which in turn they could be remunerated. This would contribute to a reduction of the total costs of ownership of a BEV.

EVs are thus an essential part of the solution to support the climate protection targets by integrating renewable energies into the grid. The decarbonisation effect of BEV has two components:

1. The substitution of fossil fuels, depending on the used electricity within an WtW (Well-to-Wheel) approach.

2. Using the flexibility and storage capacity while charging a significant improvement in the integration of RE in the grid can be achieved.

The energy load management as well as storage capacities of BEVs can play a major role in overcoming these challenges since this includes not only taking energy from the grid in a controlled manner and at specific times when it is not needed elsewhere and when the grid can handle it, but also feeding energy back into the grid for various existing and upcoming grid and energy services.

To fully leverage the concept of grid integration both technical and market requirements need to be considered. In CharIN's members' view, bidirectional charging provides major advantages for both energy provider and BEV owners, and CharIN expects the market to fully take up bidirectional charging in the near future based on the availability of BEVs capable of bidirectional charging on the market. In order to facilitate the ramp-up, small-scale individual or local solutions should be avoided.

The objective of this paper is to highlight the benefits of CCS for grid integration and bidirectional charging, and to give an outlook on the timeline for BEVs and services with these capabilities.

CCS supporting Grid Integration

CCS uses ISO/IEC 15118 as communication standard and the next edition will provide the most advanced features for bi-directional charging.

- for secured, open and non-proprietary data exchange between driver/vehicle and infrastructure/ energy system
- for charging execution: charging power can be restricted remotely during a specific time interval, thus allowing interventions from energy providers
- for charging planning: tariff tables and load profile registration allow EV drivers to benefit from demand-driven energy price advantages, and energy providers can use this information in advance for their load planning.
- both AC and DC charging is possible
- ease-of-use with Plug & Charge for authentication and billing

Stakeholders for grid integration

The following stakeholders will benefit from Grid Integration:

Stakeholder	**Benefits from grid integration**
Grid operators	Grid services/load balancing provided by BEVs w/o large infrastructure investments
BEV owners	Additional revenue generation, lower total cost of ownership due to self-optimization (home energy management)
OEM	BEV`s with optimal grid integration are more attractive to the market, avoid hurdles in customer acceptance and installation cost in terms of grid connection and grid refurbishment. Higher acceptance due to higher utilization of renewable energy. New business model opportunities in terms of energy services.
The general public	Lower overall electric energy costs concomitant to an increasing share of renewable energy and reduced CO2-emission in total.
Swarm aggregator	Aggregating the single assets in order to suit the needs of many energy market products/services with respect to min power/capacity