



SYSTEM RESEARCH E-MOBILITY: GRID INTEGRATION AND ENERGY BUSINESS P

Advanced System Technology

Am Vogelherd 50
98693 Ilmenau, Germany

Person to contact

Prof. Dr.-Ing. Peter Bretschneider
Phone +49 3677 461-102
peter.bretschneider@iosb-ast.fraunhofer.de

Dipl.-Wirtsch.-Inf. Oliver Warweg
Phone +49 3677 416-111
oliver.warweg@iosb-ast.fraunhofer.de

www.iosb-ast.fraunhofer.de

The challenge

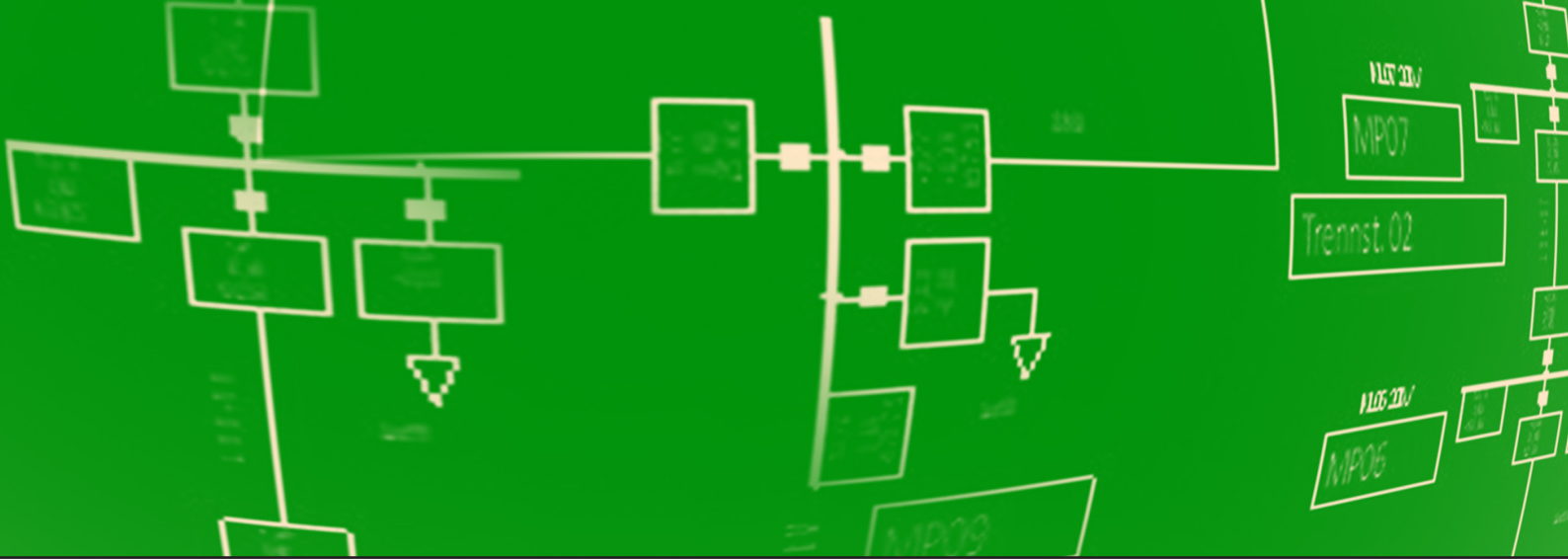
Whether currently electric distribution grids are designed for a simultaneous consumption by electricity consumers and the additional E-Mobility, particularly within cities and towns, is not yet adequately researched. The performance of these distribution grids could be exceeding through parallel charging processes of such electric vehicles (e.g. closing time). Consequently, network operators of these regions have to choose between a network expansion of the distribution grid or a smart charging management. Using such a controllable, load-dependent charging process, an additional sharing of information between the market actors (grid operator, trader, charging station operator) could be necessary.

Within »Fraunhofer System Research for Electromobility FSEM«, the Fraunhofer AST investigates the requirements of the grid integration of E-Mobility, identifies the involved market players and researches the relevant power economy aspects regarding to communication processes. Under the perspective of cost-effectiveness, possible value-added services of the vehicle energy storage, considering the infrastructure requirements (battery-charging station, billing, distribution grid expansion), are evaluated.

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Research

Grid integration of E-Mobility

In the first step, a wide-range requirements review of E-Mobility regarding to the public power supply is made. Based on a model-based grid simulation, smart control concepts of the system management are designed. The electrical storage potentials of the vehicle battery (peak load balancing) are also taking into account.

Power economics and regulatory perspectives

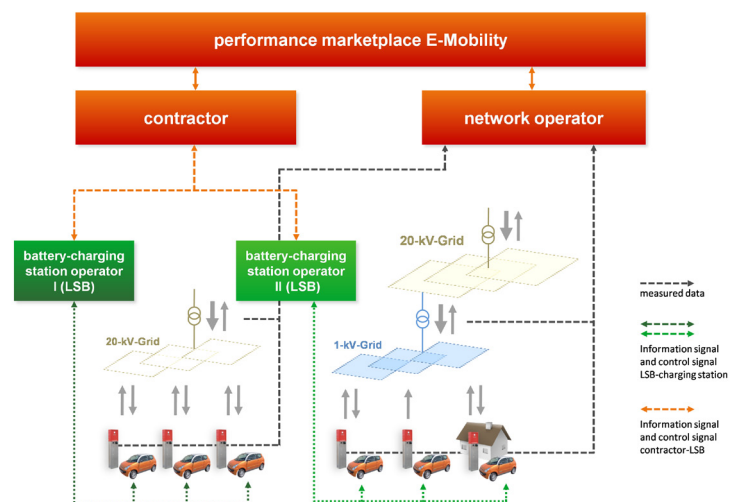
Based on current energy directives and the result of the requirements review, concepts of different charging and discharging processes are arranged (see also figure 1). Thereby, the main market players are identified, which are connected with an optimal grid operational management (e.g. avoiding an expensive grid expansion). Further analysis are dealing with the required technologies such as smart metering or energy demand management.

Business models

In a third step and in collaboration with Fraunhofer ISI and Fraunhofer UMSICHT, a reference model for the evaluation of business models and several E-Mobility scenarios is developed. This model considers the acquisition costs, services, charging stations, infrastructure and payback periods amongst others, which is the basis to generate innovative business models relating to the grid operators and considering the expected market growth of E-Mobility.

Individual traffic with electricity

In the co-operative project »Fraunhofer System Research for Electromobility FSEM«, over 30 Fraunhofer institutes develops alternative transportation systems. The aim are prototypes for hybrid and electric vehicles and supporting the German automotive industry in the new field of E-Mobility. The German Federal Ministry of Education and Research supports the project with a amount of € 44 million from the German stimulus packages I and II.



1 Possible ICT connection, roles and responsibilities