E-Mobility: DSO Challenges, Answers and the Relevance of Flexibility

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A company of EnBW

Predicted ramp-up of e-vehicles in Germany





Basis for a successful transition to e-mobility is a strong and intelligent power grid – pressure is high





- > The distribution grids are strongly stressed, especially in the low voltage (residential areas)
- Comprehensive fields of action include the provision of a customer-centered grid connection, early detection of grid shortages through transparency in the distribution grid, intelligent optimization of the existing grid and predictive as well as sustainable grid development
- Intelligent grid optimization and grid-serving charging management enable an increase of the existing grid's capacity for evehicles until the grid expansion is completed

NETZIabore - field tests under real conditions



Insights

- **Charging behavior** changes over time - range anxiety decreases
- The **maximum** 5 simultaneity of the charging processes is between 22% and 88%
- The relevance of gridserving charging management is high
- Charging management is an effective way of smoothing peak loads







E-Mobility-Carré

FOCUS: Existing apartment buildings



E-Mobility-Chaussee

FOKUS: Single family houses in the countryside

Charging e-vehicles offers flexibility - this can be used in different applications





NATURAL CHARGING

The way flexibility is used has an immense impact on **timing, simultaneity, and power requirements of charging operations**, and thus on the distribution grid.

System-serving charging changes load peaks in the local power grid

Organizational and technical background

- Using the flexibility of electric vehicles to stabilize grid frequency
- > Implementation in field test (8 e-vehicles, 11kW charging infrastructure)
- Charging processes can be scheduled by project participants via app

Targets

- Understanding the impact of systemserving charging on the distribution grid
- Investigation of the interaction between grid-serving and system-serving charging management







Looking Ahead: Grid integration of bidirectional charging



What changes with V2X?

stations develop from pure ve battery storage / generation units

 Load flows in the customer system and in the distribution grid change

What does V2X mean for the power grid?

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reneving). we are developing our grid for the annual peak load

V2G - may lead to increased grid loads, especially in combination with time-variable, market-based electricity tariffs

What does it take for successful grid integration?

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- Customer centricity and automation Digitalized and customer-centric grid integration processes
- > **Technology and standards** Development of technical capabilities as well as standardized interfaces
- Legal framework A legal framework for the use of flexibility in low voltage that takes equal account of customer and grid operator requirements





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