

Project Fact Sheet

Project Title	Collaborative project: EOM-Plus - Analysis of the short- and medium-term effects of market-based congestion management instruments as a regional and temporary supplement to existing energy-only market design, Subproject: Distribution grid level
Keywords	Grid-related flexibility, Smart Market, Congestion management, Grid extension, Power Engineering, decentralized loads and generators

Project Details

Project Start	November 2019	Duration	3 years
Funding Authority	BMW i	Project ID	03EI1012A
Project Management	PTJ		
Sponsor Program	7. Energieforschungsprogramm		
Project Budget	384.207 € (Subproject THI)		
Contact Person	Prof. Dr.-Ing. Uwe Holzhammer (Project Leader)		
Project Partners	Friedrich-Alexander-Universität Erlangen-Nürnberg; Stiftung Umweltenergierecht		

Description

So-called Smart Markets are currently being discussed as solutions that are to be made available to the electricity network operator as an additional, market-related instrument of congestion management. They function as a market for flexibility at the distribution grid level and are thus in short-term competition with regulatory redispatch and in medium-term competition with grid expansion. The activity of a smart market is both temporarily and regionally limited to phases with grid congestions and represents a supplement to the existing energy-only market design.

The research project analyses the impact of Smart Markets on the network clusters (distribution grid level) and their contribution to congestion management. For this purpose, a Smart Market Model is developed, which should adequately reflect the flexibility options available in the network cluster with their technical and economic parameters in the competition for cost-optimal load flow changes in the network. To reduce the complexity of the model, regions with similar network topology and available flexibility options are combined to form representative network cluster types. The market area of the respective Smart Markets corresponds to these specific network clusters and takes their network restrictions into account when determining the order of deployment (so-called Merit Order). Smart Markets thus represent a link between market and electricity grid. They enable the integration of new market participants for whom there are no incentives for a grid-related schedule adjustment in existing electricity markets. The predicted grid congestion in the transmission grid or also in the distribution grid serve as the switch-on signal for the Smart Market Model.

The switch-on signals contain information about the duration and amount of the required power adjustment in the network cluster. With the developed Smart Market model, the most cost-effective solution for the affected network cluster and thus the market price arising in Smart Markets is to be calculated. To determine the financial upper limit, information on the spot market prices and the costs for the electricity grid expansion are required. It is also conceivable to include other price components, such as the monetary valuation of the CO₂ reduction achieved through efficient management. A further model result is the aggregated flexibility in the grid cluster (performance, demand adaptability and responsiveness), which can be made available to the upstream grid under the determined financial ceiling and technical restrictions. Thus, statements on the amount of additional revenues for the flexible capacities and the avoided costs due to the saved regulatory redispatch, as well as on the additional integration of vRES electricity (wind+PV) with less grid expansion can be generated.