SiNED-Ancillary Services for Reliable Power Grids in Times of Progressive German Energiewende and Digital Transformation

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Abstract

Within SiNED research project, several members of the ***Energy Research Centre of Lower Saxony*** (Energieforschungszentrum Niedersachsen, EFZN) are working on various issues relating to the future provision of ancillary services and to future congestion management. The questions include energy technology, economic and energy law aspects as well as information and communications technology (ICT) and data. The investigations are based on Lower Saxony and the framework conditions there. The temporal focus of the investigations is the year 2030.

1 Introduction

In order to achieve climate targets, all sectors will switch to increased renewable share in the coming decades. For this reason, the electricity generation will increasingly be based on a large number of decentralized and fluctuating photovoltaic arrays and wind turbines. In conventional power systems, ancillary services (ASs) for the reliable operation of power grids were provided centrally by large-scale power plants. In the transformed system though, these ASs have to be provided by a plenty of decentralized energy resources (DERs), *i.e.* distributed generators (DGs), renewable energy resources, loads, storage units and electric vehicles, which are highly distributed in the distribution grids. Thus, the information, communication and energy flow with and inside the distribution grid will therefore increase. This increases the need of grid operation management for provision of ASs from DER. This also leads to increased requirements regarding resilience of the digital transformation of the energy system, as well as to new demands concerning the economic and legal framework conditions of future electricity supply systems.

The joint research project ***SiNED***, conducted by Energy Research Centre of Lower Saxony and consisting of nine reasearch areas (RA), is established in order to further develop the existing ancillary services to prepare for future power systems and to adapt these to new requirements and opportunities presented by digitalization and the progressing Energiewende. Solutions for a reliable future grid operation are developed and examined in an interdisciplinary way by several partners, which are all members of EFZN (see Figure 1).

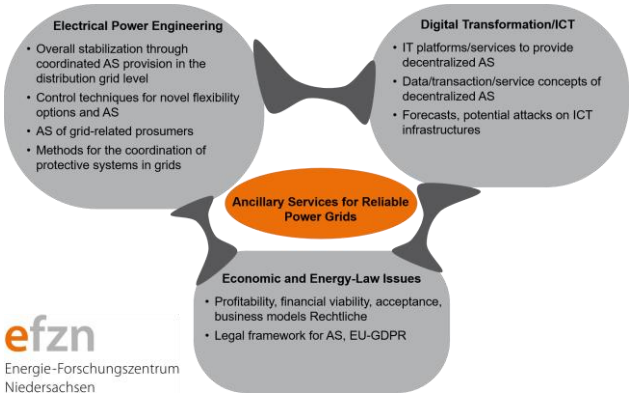

Figure 1 Project overview