

Target Grid Analysis as a Challenge

in the Light of Electromobility, Storage Technologies and Decentralized Generation

Operators, municipalities, and planners alike are faced with contemporary and future challenges due to the development and the optimization of power transmission and distribution networks and the increased capacity utilization of the electric grids by charging processes of electric vehicles. With a comprehensive electrical product and service portfolio and many years of experience, STEAG Energy Services (SES) supports its customers in the industrial and municipal sectors to ensure sustainable, individual, and future-oriented grid solutions.

Our focuses

For more than 40 years, SES has been active on the market with services and consulting in the municipal and industrial sectors. In particular, our experience and consulting portfolio comprises static and dynamic grid calculations, analyses of individual protection concepts and respective recommendations for the setpoints of the protection relays. We design the grid connections of production and generation plants according to regulatory requirements and render planning services for the integration of thermal and renewable generation assets in compliance with VDE appli-

cation guidelines. The concept development for the black start capability of generation plants is part of our portfolio, similarly as analyses for the integration of battery storage solutions into existing or new plant concepts.

Our comprehensive approach

Focussing the customer's targets, SES considers the project execution a holistic approach for planning and consulting. Starting from an evaluation of the actual is-situation, analysing the weaknesses and the execution of the concept study, the basic engineering and subsequently creating the supplier-neutral tender documents and the contract negotiations with manufacturers are subsequent steps in this approach. During implementation, SES provides expert support in the factory acceptance tests of electrical components, the erection supervision and the coordination of the commissioning. Our consulting approach covers generation and grid simultaneously. We examine and calculate effects of generation units in combination with transmission and distribution networks, enabling our customers to fully understand the static and dynamic behaviour of their systems.

The incentive scheme of the German Energy Economy Law forces municipal distribution network operators to systematically reduce their grid costs. Target grid planning is a crucial method of the asset management to optimize the power networks. Historically grown grid topologies, their number of feedings as well as their level of interconnection and the equipment are put to the test, both technically and economically. At the same time, e-mobility



and heat pump integration are strongly emerging consumer scenarios. SES supports distribution network operators to evolve their grids' technology towards future requirements and to operate them even more efficient.

Services related to grid design

- Short-circuit current calculation according to DIN EN 60909
- Load flow calculation (by modelling lines, transformers, generators, motors, etc.)
- Reliability assessment in the analysed network area
- Determination of interruption frequency HU and non-availability QU
- Designing the future network structure considering the equipment utilization, the admissible voltage range, the (n-1) availability and the intended service reliability
- Assessment of economics for the suggested measures
- Supplementary services: developing protection concepts for electric equipment and recommendations for the setpoints of the protection relays considering selectivity aspects

Selected references

- Power supply of the computing center of E-Shelter in Frankfurt, Germany
- Design and project implementation of the 110 kV main distribution switchyard of Evonik Industries at their chemical plant in Marl, Germany
- Redesign of the 110 kV plant feed-in replacing the existing 35 kV feed-ins of Evonik Industries at their site in Herne, Germany
- Grid calculations for plant expansions of Evonik Industries at their site in Antwerp, Belgium
- Developing the protection concept of the medium-voltage network of Evonik Industries at their site in Worms, Germany
- Basic study on target grid planning for BP/Ineos at their site in Cologne, Germany
- Analysis of the black start capability of the combined-cycle power plant of Currenta at their site in Dormagen, Germany
- Protection and selectivity analysis of a refinery of Total
- Short-circuit current calculation of the steel works of Hoesch in Hohenlimburg, Germany