SMART SOFTWARE SOLUTION FOR DISTRIBUTION GRIDS AND SMART GRIDS: OPEN RESEARCH AND OPERATION PROTOTYPE (OROP)

Challenge

Most of the 1.78 million kilometers of power lines in Germany are low voltage and medium voltage. These lines, which form the traditional distribution grid, are a crucial part of Germany’s energy transition (Energiewende). Most wind and photovoltaic systems are connected to the distribution grid; this amounts to far more than a million devices. In addition, novel devices such as e-mobility, grid operation, smart metering, heat pumps, combined heat and power, and demand-side-management are implemented on the distribution grid. To still fulfill the power system’s requirements, new planning methods, grid operation strategies, and training solutions must be developed.

Solution

OROP (Open Research and Operation Prototype) is a modern research platform. Its functional model offers an innovative approach to plan and operate distribution grids, aiming to fulfill the power system operators’ needs. All system components, from generators to a range of Smart-Grid-specific loads, can be modelled and analyzed in OROP’s GIS-based environment. OROP also features time series simulations, which can check the validate the operation strategy. OROP’s applications include research projects in e-mobility, as well as local and public load dispatching, and EV charging management.
### Features
- GIS-based design and analysis of distribution grids
- Symmetric and asymmetric load flow calculation
- Grid capacity analysis for symmetric and asymmetric loads and generation

### Applications
- R&D platform for smart grid applications
- R&D platform for GIS-based infrastructure analysis
- Grid capacity analysis for decentralized generation (PV, wind, CHP, storages)
- Analysis tools for grid operation methods (e.g., local load management, adjustable transformer station, U-Q-control)
- Analysis of local and public load and charging methods
- Monte Carlo simulation for variable supply tasks

### Perspective
- Integration module for EMS-EDM PROPHET®
- Statistical analysis of dynamic and static data
- Support of CIM (common information model)
- Integration of SCADA systems
- Parallelization of power flow calculations
- Training platform for distribution grid operators