

// SMART GRID EXPANSION - DECENTRALIZED LOW- AND MEDIUM-VOLTAGE POWER GRID CONTROL

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BACKGROUND

Smart power grids can monitor and regulate themselves—depending on utilization, available capacity and the capability of existing infrastructure. A new process from the University of Wuppertal and SPIE SAG GmbH involves the installation of control units for low- and medium-voltage grids.

DEVELOPMENT STATUS

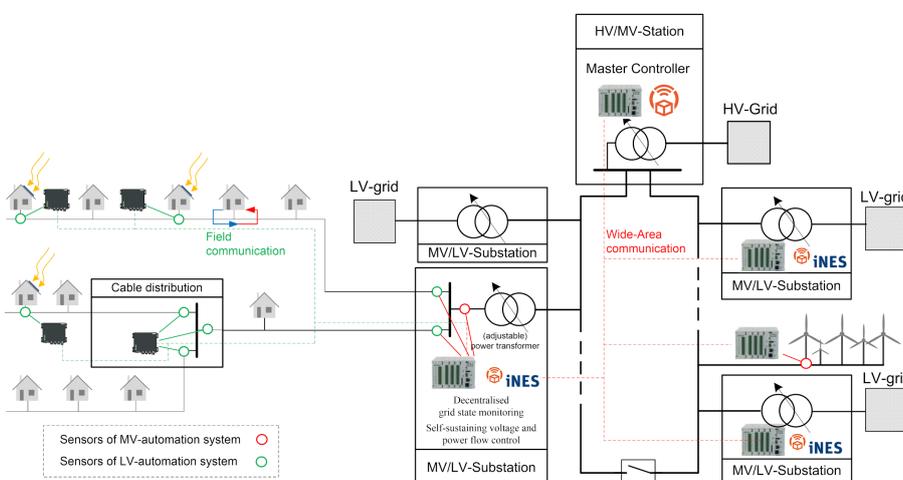
Laboratory model

SOLUTION

A higher control unit is installed in the main grid, i.e., the low- or medium-voltage grid, along with several lower control units in the sub-grids. These sub-grids are usually low-voltage grids or low-voltage grid segments, called local grids. The lower control unit is connected to a multitude of actuators, such as renewable energy-generating facilities or charging hubs that significantly influence the state of the sub-grid and can even alter it, if needed. This control unit compiles the relevant state data from the actuators and transmits it to the higher control unit. The higher control unit monitors the state of the main grid and can command one or more lower control units to take actions to stabilize the entire grid, though the lower control unit itself decides what actions to take in the sub-grid.

CATEGORIES

//Electronics and electrical engineering //Electric power transmission //Instrumentation and controls engineering technology //Energy engineering //Energy engineering and energy storage



Decentralized grid configuration monitoring

ADVANTAGES

- Optimal control of low- and medium-voltage grids
 - Allows for cost-optimized grid expansion
 - Decentralized communication capability
 - High control potential with regard to power plants and consumers
 - Generates data for grid state estimations
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SCOPE OF APPLICATION

Power grid operators and, in particular, distribution grid operators can benefit from this new technology in various ways since it can not only provide voltage stabilization but also avoid grid overloads. Another possibility is control with regard to power plants, such as solar and wind, as well as heavy consumers such as electric vehicles. Grid expansions can be optimized and targeted by efficiently and optimally utilizing existing grid capacity.

SERVICE

A patent has been published under EP3168949A1 and granted in 12 EU countries. We are offering interested companies the opportunity to license and continue to develop this technology with the inventors at the University of Wuppertal.

PUBLICATIONS & LINKS

Korotkiewicz, K.; Steinbusch, P.; Modemann, M.; Paulat, F.; Zdrallek, M.; Hetzel, S.; Dietzler, U.; Vormelker, J.; Schlüter, U.: Medium Voltage Grid State Control as a Basic towards a Holistic Automation in Smart Distribution Systems Proceedings of the CIRED Workshop, Berlin (2020).
