STeP – Smart Technology Planning

Operation planning of new technologies

Against the background of an increasing penetration of decentralized generation plants and new loads in distribution grids, the challenges for a secure and efficient grid operation are increasing. One solution could be innovative grid equipment and operation concepts. These options are often based on secure and reliable information and communication technology (ICT), which enables the connection and networking of sensors and actuators. In addition to network operation, metering and metering are also subject to technical change as the energy system becomes digital. A successful rollout of intelligent metering systems depends on a suitable choice of ICT infrastructure.

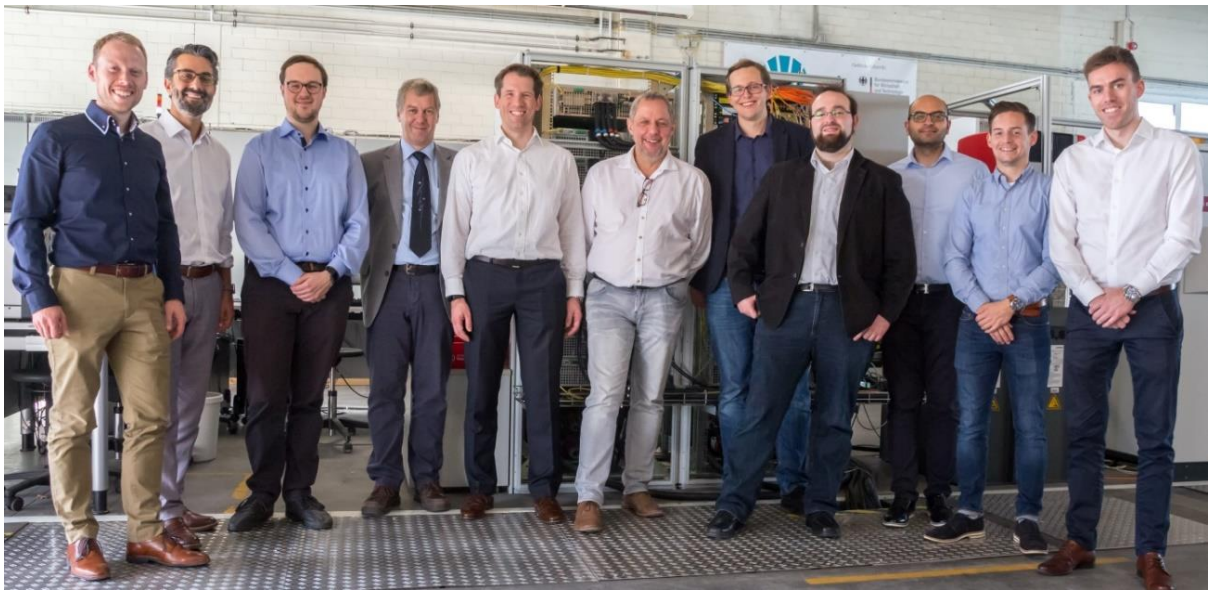

Figure 1: STeP – Kick-Off-Meeting (from left to right: Marcel Kurth (IFHT), Anil Mengi (devolo), Malte Peikenkamp (Schleswig-Holstein Netz), Holger Hirsch (Uni Duisburg-Essen), Tobias Pletzer (Schleswig-Holstein Netz), Uwe Maschmann (Schleswig-Holstein Netz), Benedikt Klaer (IFHT), Axel Staubach (Uni Duisburg-Essen) George Hallak (devolo), Thomas Rahmen (RegioNetz), Paul Kunzemann (Projektträger Jülich))

Requirements for ICT in electricity supply

When selecting suitable ICTs, various criteria must be considered with regard to technical requirements as well as cost-effectiveness and must be adapted to the respective application. Thus, for the implementation of load-flow controlling concepts for the elimination of grid bottlenecks or voltage band problems, ICT can be subjected to increased requirements in terms of availability or latency. Continuous monitoring of the grid status at distributed locations increases demands on the achievable data throughput of ICT. Further possible requirements and targets for the field planning of ICT are reliability, scalability, investment costs, operating costs, sustainability of the solution and independency from third parties.

Integration of Powerline Communication

Powerline Communication (PLC) offers the possibility to establish a communication network based on the existing power cable infrastructure in the distribution grid. In previous pilot projects, it has been shown that the PLC is basically suitable for applications in the area of network operation. However, there is a large portfolio of challenges in the low-voltage grid that can have a negative impact on transmission and prevent 100% reliability. Changes in the network structure or an additional connection of power electronic consumers and generators

can also lead to changes in the physical signal propagation or data decoding. Time-variant phenomena regarding the emission of interference or impedances of equipment can occur as a function of the operating point. This means that an assessment of the long-term reliability of PLC lines based on short-term field measurements for the network planning process cannot be guaranteed. Even before using ICT in the field, foresighted planning should ensure that grid equipment and ICT do not influence each other.

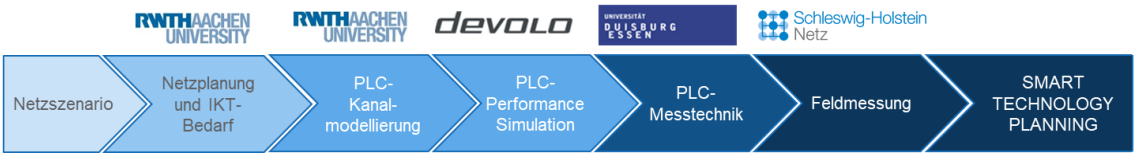

Figure 2: Project structure und partners

Mobile measuring device and integrated ICT and energy network planning tools

In the project "STeP - Smart Technology Planning" sponsored by the Federal Ministry of Economics and Technology (BMWi), Devolo AG, RWTH Aachen University, Schleswig-Holstein Netz AG, the University of Duisburg-Essen and Regionetz GmbH have therefore set themselves the goal of developing a method for integrated distribution grid and PLC technology planning taking into account scenario and use case-dependent requirements. The developments will be accompanied by field and laboratory tests in order to ensure practical and realistic approaches. Possible negative effects on PLC lines (e.g. due to power-electronically connected equipment) will be investigated extensively in the large-scale laboratory of the RWTH Aachen University based on a wide variety of real equipment and directly taken into account in network planning. Furthermore, for the physical analysis of the transmission quality of problematic PLC lines, a mobile and practical PLC long-term measuring device is developed and subsequently tested and validated within the scope of field tests.

Project information

Partners

- devolo AG
- RWTH Aachen
- Schleswig-Holstein Netz AG
- Universität Duisburg-Essen
- Regionetz GmbH (assoziiert)

Facts

- Acronym: STeP
- Duration: 09/2018 to 08/2021

Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag

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