

Innovation type:
Test framework

TRL: 5-6

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Target group:

Actor/ purpose	x
DSO, TSO	X
Technology provider	X
Member organisation	
Market operator	
Research/ Consultancy	X
Teaching	

Voltage regulation laboratory setup

Challenge

To facilitate the massive integration of Photo-Voltaic (PV) generation in distribution power system grids, there is a need to create new solutions to preserve voltage inside grids regulation limits. The inadequate power injection of large amount of PV generators at different grid locations can produce over-voltages that carry power losses or un-wanted bidirectional power flows.

Solution

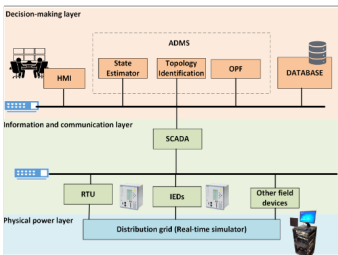
To develop a laboratory demonstrator of Advance Distribution Management Systems that describes and validates the necessary tools involve in the voltage regulation task. The laboratory setup involves a real-time simulation of a distribution grid, a wide-area communications network with 5G or wired links, a topology identification method, one distribution state estimation method and an optimal power flow method that represents the voltage regulation for the distribution grid.

Potential

This setup involves all tools in distribution power systems necessary for monitoring and control the voltage. The laboratory setup can be used for collecting synthetic data for testing ADMS of DSOs or testing one of the tools in ADMSs. The laboratory can be used also to investigate issues on voltage due to integration of PV generation in Norway. The setup is also useful for teaching operators or students what is necessary to commit the voltage regulation in distribution grids.

Reference in CINELDI

- WP2, T2.20 voltage regulation
- S. Sanchez Acevedo: "[Cyber-Physical Distribution Power System for Assessing Voltage Regulation with State Estimator and Topology Identification in the Loop](#)", presented at IECON 2024.



Tools and systems in the voltage regulation of electric power distribution grids.