Sensitivity analysis of low voltage distribution grid in rural areas with high penetration of PV systems

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Introduction and background:

There is an increasing trend of installing PV systems in households. Most of these are grid-connect. Norwegian regulations allows customers to produce and deliver the same amount electricity to the grid, as they can consume. The grid is not built for power producing customers. The DSO (Distributed System Operator) Lede have experienced problems in voltage quality after wants to look at the impact of the grid from PV system, in particular for rural areas, where the grid is weak.

Problem description and objective:

The main goal of this project is to analyze the impact of high penetration of PV systems on the existing grid. The DSO, Lede AS provides the data. The data will be used in grid simulations and sensitivity analysis to determine the impact of PV systems on different grid parameters. Simulation results are used to find one or more thresholds parameters that triggers an investment in the grid caused by PV systems. The following sub-goals are:

Find a general threshold that can determine when the grid needs investment to handle new PV installation for households in the grid.

Map the development of PV installations.

Investigate the future need for investments in Lede's grid to meet the growth of PV installations.

Investigate different countermeasures that can handle the future requirements of the grid.

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