Contribution of Electric Vehicle Charging Infrastructure to the Stable Operation of Islanded Microgrids

Bachelor- or Masterthesis

The significant amount of power generation by distributed renewable energy sources opens the possibility of operating existing medium and low voltage microgrids in islanded mode. Thus, in case of a large-area breakdown of the transmission grid (blackout) the energy supply of local communities can be ensured. Furthermore, the grid restoration process may be supported. Due to the increasing penetration of private or public charging points for electric vehicles, their contribution to stable operation of the islanded microgrid becomes more relevant. Events as the reconnection of loads or tripping of a generator occurring during the grid restoration process can cause high voltage and frequency deviations potentially leading to the breakdown of the islanded grid. A possible strategy for stabilizing the dynamic behavior is the adaption of the active and reactive power demand of the charging point depending on voltage and frequency measurements. Beyond that, even an active power infeed may be taken into consideration for islanded microgrid operation during a blackout.

Goals and core tasks of a thesis:

- Literature research on islanded microgrids and characteristics of charging points
- Development of a simulation model emulating the dynamic behavior of charging infrastructure (e.g. in the form of a power electronic converter) during islanded microgrid operation
- Analysis of the impact of active and reactive power adaption strategies on the dynamics and the stability of voltage and grid frequency

Your profile:

- Study of engineering or business administration and engineering (e.g. electrical (power) engineering or comparable)
- Interest in research on grid integration and control of electric vehicle charging points
- Skills in MATLAB® / Simulink® are an advantage

Contact

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Focus

- Islanded Microgrids
- Grid Integration of Charging Infrastructure
- Power System Stability