

# Bachelor's Thesis

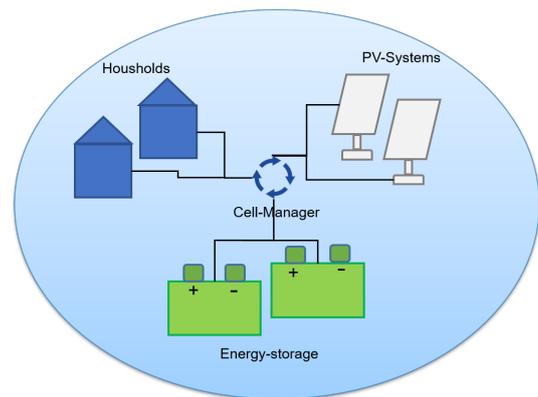
## « Simulation of the Cellular Energy System-concept in the low voltage grid »

### Motivation

The Cellular Energy System is a new organizational model for energy supply. Its goal is to improve the supply security and stability inside the energy system. In this concept, the cyber-physical energy system is divided into spatial cells. These cells are aggregated over several voltage levels.

A simulation model representing the low voltage level of the concept has already been implemented on the Omnet++ network simulation tool. This contains power components such as a generator, an unregulated load and a cell manager. Currently, the cell manager is responsible for the physical balance between energy supply and energy demand at the low voltage level.

The current simulation runs as follows: Every second the power components send their consumption quantity or generation capacity to the cell manager on a regular basis. The cell manager in turn calculates the total consumption and generation, creates a schedule based on the merit-order-method and sends this to the respective energy producers. They execute the schedule via the physical connection.



### Your tasks

The objective of this bachelor thesis is to investigate how the cell management contributes to supply stability in the low-voltage grid. For this purpose possible control methods in normal operation are to be investigated.

For the above mentioned investigations an existing simulation model shall be extended on Omnet++. A generator (already implemented), a renewable-energy generator, a regulated load, an unregulated load (already implemented) and an energy storage system are required. By integrating the necessary measures to maintain supply stability, the model should become supply stable and resilient to anomalies in the low voltage grid.

### Your profile

- Field of study: Energy Systems, Electrical Engineering, Computer Science or any related field.
- Good programming skills, e.g. Omnet++ and C++,

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