Master / Bachelor Thesis:

Control Strategy for Energy Management Systems for Commercial electrical Energy Systems

Electrical energy systems in companies are becoming increasingly complex. Whereas in the past, peak loads were minimized at most, today we find PV systems, controllable electrical loads and battery storage systems. In addition, power supply companies like EON or Vattenfall offer flexible electricity tariffs that only lead to cost reductions if the company's energy system can also react flexibly. Electrical energy systems in companies are becoming increasingly complex. Whereas in the past, peak loads were minimized at most, today we find PV systems, controllable electrical loads and battery storage systems. In addition, power supply companies offer flexible electricity tariffs that only lead to cost reductions if the company's energy system can also react flexibly.

The energy management system monitors the components of the energy system (e.g. PV, controllable electrical loads, battery storage) and controls them so that an optimum results for the operator. In this master thesis, it is investigated how a suitable (EMS) is structured so that it can serve different use cases simultaneously or consecutively. This creates the added value for the operator. The EMS is simulated in Python and verified with real customer data.

Tasks:
- Literature review of Energy Management Systems in general.
- Analysis commercial energy systems and the corresponding use cases.
- Definition of cost functions that cover theses use cases.
- Literature review and definition of methods to solve the cost function.
- Build a simulation environment in Phyton.
- Apply different cost functions and solving methods.
- Analyze the results and draw conclusion on the most suitable approaches.

Requirements:
- Background in Electrical Engineering or Software Development.
- Strong programming skills.
- Good team-player and an attitude to learn and explore new approaches.

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