

Bachelor's Thesis

« A Demand-Response Algorithm Based on Linear Programming »

Background

Since several years the amount of fluctuating, renewable energy from wind and solar farms is steadily increasing. Nevertheless, thermal power plants to continuously balance produced and consumed power are still required. There are times, in which more energy is produced than needed. Demand response (DR) makes electrical loads contribute to power balancing by shifting power consumption to times with higher power availability. The Institute of Telematics conducts research on how thermal storage units such as water heaters, freezers, or waterbeds can be set up for demand response. The goal is to balance the requirements of saving energy and shifting power to times with higher power availability by scheduling heating phases such that costs according to an electricity exchange's virtual electricity tariff are minimized.

Work Description

The current scheduling algorithm uses a simple heuristic. The task of this thesis is to implement a family of scheduling algorithms using the technique of *Linear Programming* and compare their quality with the heuristic. In particular the run time behavior must be analyzed. To implement these algorithms the Java library LP-Solve is to be used (<http://lpsolve.sourceforge.net/5.5/>). To evaluate the algorithms data from a real installation of a thermal storage and trading prices published by electricity exchanges are available.

Prerequisites

- Knowledge of the programming Language Java
- Interest in analysis of algorithms

Knowledge about linear programming is not required.

Research Context

This current status of the research can be found in the paper *demand response approach locally implementable for waterbeds*. (<http://dx.doi.org/10.1109/NetSys.2015.7089088>).

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