Master Project

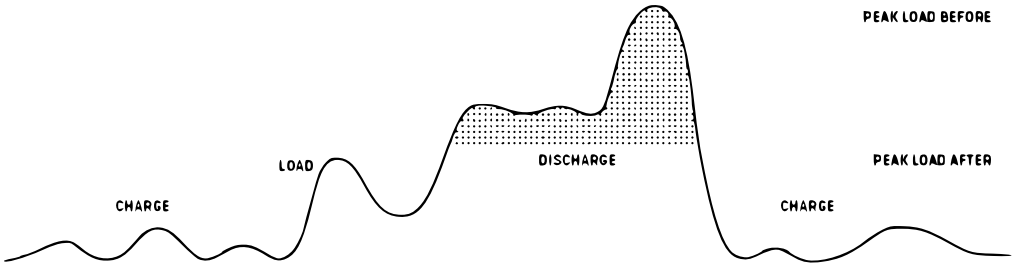
Peak Shaving in Battery Management System: A Dynamic Programming Approach

Francisca Mestre, Delft Center for Systems and Control, TU Delft
F.I:SilvaCruzGuerreiroMestre@student.tudelft.nl

Peyman Mohajerin Esfahani, Delft Center for Systems and Control, TU Delft
P.MohajerinEsfahani@tudelft.nl

Context

From a system operator point of view, a flat electricity consumption is preferred as compared with a bumpy one for many reasons. Most importantly, a flat load reduces the need of expensive fast-ramping power plants. In order to incentivize a flat load opposite to a bumpy load, consumers in low-voltage grid are charged not only for their energy consumption but also for peak in terms of power. Thus, shaving the peak is of interest to many industrial consumers as well as communities.



Advances in battery technology make it attractive for peak-shaving purpose. However, managing limited storage of battery given a highly uncertain load without that much of history is not a trivial task.

Project tasks

The goal of this study is to design a data-driven decision-making tool to determine an optimal charging and discharging strategy of battery with the objective of minimizing energy and peak costs using Dynamic Programming. Given a technical description of a battery, available history of the electricity consumption of a client, and online measurements, the tool shall decide on the optimal power output of battery in term of achieving minimum costs as well as minimum battery cycles.