[Paper: An accurate charging model of battery energy storage](https://evbass.fer.hr/images/site_4351/An%20Accurate%20Charging%20Model%20of%20Battery%20Energy%20Storage.pdf)

* Explore dependency of charging on SOE
* Bridge gap between low-level battery charging constraints and high-level battery operation models
* LP that captures variable battery charging limit that can be incorporated into battery operation/investment planning model
* Three models (i) constant charging limit (ii) charging power limit with linear reduction at constant voltage paat of charging curve (iii) piecewise linear approximation of available charging energy (as proposted in the paper)
* Battery SOC(State of charge) SOE same thing: amount of energy stored wrt charge that battery contains when fully charged

SOE is in Watt hours (

Battery operation model formulations (energy storage bidding model)

Assumptions: the day-head only market is considered, energy storage max profit by energy arbitrage. Energy storage is price taker and cannot affect market prices(known in advance, not stochastic)

1. Constant charging power limit

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C^E is battery energy capacity

1. Reducing Charging Power (Linear CC-CV const current, voltage model)
2. Model with energy charging limit

* Based on battery ability to absorb energy as function of SOE. Delta SOE vs SOE non-linear curve
* Piecewise linear approximation

Same as (1) without first constraint but add

A graph of a function

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Case studies: Fictional 10MWh battery acting in EPEX day-head market

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