

Project title: Optimization of energy storage services for a smarter grid

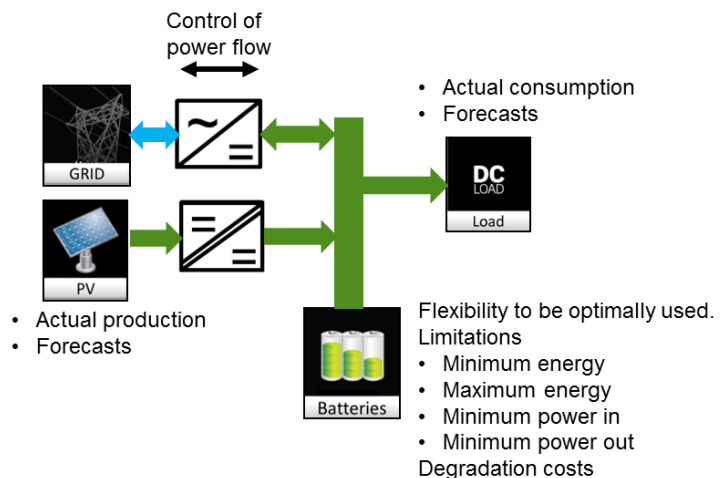
Background

The distribution grid in most electricity markets face increasing challenges due to increasing intermittent power generation from renewable energy resources at the distribution grid level as well as to varying peak load demand. Energy storage represents a flexible tool that can be applied for various services, with various economical values. Examples of values and incentives to be optimized using energy storage are: Grid frequency support, Time-of-Use of electricity, Demand Charges, Demand Response, Back-up capability.

The Norwegian company Eltek is a global industrial solution provider for complete systems for power conversion, storage and control. This project would provide insight into a 'hot', global market opportunity related to smart grids and renewable energy where advanced control theory is essential and there are relevant Norwegian industrial technology providers.

Opportunity and challenge

How could the flexibility of a battery be optimized by controlling the power to/from the grid, subject to various incentives (with different time scales) and "disturbances" from loads and solar production?



Challenges to solve could be:

- How to specify the economic objectives for the various incentives?
- How to model the various constraints and cost functions,- e.g. the cost of charging and dis-charging cycles of the batteries?
- How to develop an optimization algorithm based on incentives, costs, disturbances, forecasts and constraints?

Project tasks

- Describe the various incentives for using energy storage
- Develop an objective function, system model and relevant constraints
- Develop a control strategy to optimize the use of such energy storage
- Develop a simulator for an analysis of the optimization performance, the value of energy storage, and the sensitivity of various system parameters.

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