Title: Optimal Sizing of Energy Storage and Fast-Ramping Generation in the Electric Power System Under Uncertainties

Duration: 01/2014 – 12/2014

Sponsor: Joint Institute of Engineering CMU/SYSU

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Description: This project aims to find the optimal sizing and placement of Energy Storage Systems (ESS) for the facilitation of intermittent energy integration in the electric power grid. Two-stage Stochastic optimization is employed to solve the planning problem, where a wide number of scenarios (days) is considered and the optimal usage of the storage is solved simultaneously with the optimal generation outputs and size of the storage. Wind forecast errors are taken into account in the optimization problem via Chance (Probabilistic) Constraints, and an analytical form for these constraints is derived. This allows for the stochastic optimization problem to be solved directly, sizing the storage to account not only for a wide range of potential scenarios, but also for a wide range of potential forecast errors.