UNC CHARLOTTE
The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

Senior Design Project Description for SPRING 2017
Project Title: Battery Energy Storage at Distribution Level (CAP_BEES)

Supporter: CAPER
Supporter Technical Representative: ASSIGNED
Faculty Mentor: _____ ASSIGNED __X__ TBD (check one)
Single Team __X__ Dual Team _____ (check one)
Personnel (EN/ET): __3__ E, __1__ Cp, _____ Cv, _____ M, _____ SE
(Complete if the number of students required is known)
Expected person-hours: (250 per student)

Description of Project:

Duke Energy has a pilot project to assess the benefits of battery energy storage (BES) on a power distribution system with large solar generation. In this project students will develop a simulation based assessment tool. The tool will be able to determine the main performance metrics for a given system.

For this project students will be given a utility distribution circuit model and historical data for the associated circuit. Students will use one of the simulation tools to simulate the system and the BES, and obtain data from these simulations for assessment.

Similar projects will be given to teams from NCSU and Clemson and the cooperating between schools is encouraged to determine best methodologies for the work outlined. Each school's participants will be given a different circuit to investigate as well as a different focus area to determine benefits gained by the utility from the battery.

Initial Project Requirements (e.g. weight, size, etc.):

The BES assessment will have the following requirements:

1) Simulate the given distribution circuit using a simulation tool, and simulate its operation for the given load profile.
2) Select a BES to be used and model it using Matlab.
3) Develop a cost estimate for the supply and installation of the BES.
4) Select two BES control modes implemented on the pilot project and simulate them on Matlab. Possible modes include PV firming, energy time shift and peak demand reduction, voltage regulation, power quality and micro-grid capabilities.
5) Develop a Matlab based assessment tool which will obtain the results from the simulations and quantify the benefits associated with BES. These include savings due to demand shift, PV firming, increasing host capacity.
6) Validate the simulation results with the field data to be provided by the sponsor.
7) Conduct a cost-benefit analysis based on simulation results and the data provided by CAPER.

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Expected Deliverables/Results:

The deliverable will be a report detailing the results of the analysis. The results will be presented to industry at a CAPER meeting.

List here any specific skills or knowledge needed or suggested (If none please state none):

None