EE 491 Bi-Weekly Report 3

9/24/18 – 10/8/18

Group 11

High-Level Design of a Distribution Microgrid

Client: Alliant Energy

Advisor: James McCalley

Nick Stitzell – Communications Engineer

Minoru Fernando – Research Engineer

Joe Thurin – Power Engineer

Taylor Murphy – Power Engineer

Remo Panella – Data Engineer

Project Objective:

Create an excel document that estimates the cost of incorporating distributive generation and storage into a microgrid system at Nichols, IA.

Summary:

This week was our first official meeting with Alliant. It had been difficult setting up a schedule that works for this semester, so it took us longer than necessary. Whether that be a lack of communication or slow feet going into our last semester of college, we need to up the focus going forward.

We've received new load data from Alliant that was collected over the summer. There was a period of a few days where the data collection system was offline so there is a gap in the data. This gap is small enough that it shouldn't affect the reliability of the data.

This week we finalized our end-design for the prototype by collaborating with Alliant. This end-design will not include any kind of MATLAB simulation. Originally, this was going to be a route we as a team explored to simulate a large quantity of environments simultaneously. However, Alliant feels that this time could be better used and outside the scope of this project. Alliant has a new microgrid research team that will be continuing work on our project and using it as a foundation for further research, it does not need to be a perfect design of a microgrid.

Past Weeks Accomplishments:

We spent last week preparing for our meeting with Alliant by researching some of the topics of concern we had and making the prototype more user friendly. We did this by moving data into more organized tables and making them more clear.

Pending Issues:

We were not sent the correct load data to enter into our simulation tool from the new data collected over the summer, which set us back a week on updating the simulation.

Individual Contributions:

Team Member	Contribution	Weekly Hours	Total Hours
Nick Stitzell		3	67
Minoru Fernando		3	57
Joe Thurin		4	71
Taylor Murphy		3	57
Remo Panella		3	59

Plans for the Coming Week (10/8/18 – 10/22/18):

Next week we will continue entering in the new load data into the prototype, painstakingly moving data and formulas around to be more user friendly, and creating new ways of representing one time and reoccurring costs of the microgrid.

Summary of Client Meeting (9/27/18):

Advisor Meeting from 9/13/18

- We need to nail down with Alliant EXACTLY what they will be using our end deliverable for and how they would like it packaged.
- Will they be wanting us to give Alliant a presentation?
- Are they wanting a simulation tool? A design tool? Both?
- How are the Vars (Reactive Power) created? What will give the microgrid a frequency of 60 Hz
  - Grid forming vs. grid following
  - Where will the balance between real and reactive power come from?

Client Meeting on 9/27/18

- Reviewed the current state of the simulation tool with Alliant with a presentation that had been prepared

- We will be working on simplifying the user process so that it only takes one click to simulate multiple years' worth of data
- New Alliant grid modernization group formed which will use our tool and present results to people who will decide if the projects will continue
- We will be adjusting the tolerance level for excess demand. We're currently using 5% year round.
  - Should this be variable throughout the year?
  - Ex: 1% in the winter and 10% in the summer?
- We're all realizing that there is a list of "fringe" factors that affect the reliability and design of the microgrid that we likely won't get to in our project
  - Reactive Power fluctuation in the grid
  - Geographical effects
- This microgrid project is very new to many people in Alliant, so there are excited to have a rough tool that will direct conversations in their company with things such as battery sizing, variations in battery storage, excess demand's effects on supplemental generation, etc.
- We will read up on battery chemistry advancement in battery flow technology