EE/CprE/SE 491 WEEKLY REPORT 10

11/15-11/21

Group number: sdmay25-02

Project title: Ames Microgrid Evaluation and Substation Consulting

Client &/Advisor: Adam Arnold (Burns & McDonnell) and Dr. Zhaoyu Wang

Team Members/Role:

- **Sean Carver - Transmission Team (Substation)**
- **Bethany Danley - Distribution Planning Team**
- **Thomas Edwards - Distribution Planning Team**
- **Nathan Kallal - Distribution Planning Team**
- **Mina Khalil - Transmission Team (Substation)**
- **MacKenzie Woods - Transmission Team (Substation)**

o **Weekly Summary**

This week, the Distribution team met with Adam to review data from the on-campus utility, including power factor ratings and hourly campus load profiles, which were deemed acceptable. The client requested graphical representations of the data, identification of peak summer and winter loads, and analysis of shoulder days in summer and fall, aiming for four key data points annually. They also requested a 24-hour load profile visualization in Excel, with a stretch goal of implementing the analysis in OpenDSS modeling software. The Transmission team sent the initial one-line diagram to the client for review, incorporating ACADE justifications, and began working on the General Arrangement mock-up and the relay functional design. Additionally, both teams toured the ISU power plant and substation on Wednesday, November 11th, gaining valuable insight into campus power infrastructure and operations.

o **Past week accomplishments**

- Transmission Team: A past week's accomplishment for the Transmission team was finalizing the initial one-line diagram for review by the client, incorporating ACADE justifications to support the design decisions.
- Distribution Planning Team: During the last week, the distribution team furthered their progress developing a load profile for the microgrid on campus. They also attended the power plant tour and got more information on the medium voltage bus layout on campus.

o **Pending issues**

- Transmission Team: Pending issues include awaiting feedback from the client on the initial one-line diagram and determining which client standards to follow for the project, such as

whether to base the design on standards from NextEra, Duke Energy, or another entity.

- Distribution Planning Team: There are no current pending issues for the distribution team. We received feedback from the client on our most recent work, and are now working towards incorporating the advice into the next iteration of the load profile.

o **Individual contributions**

NAME	Individual Contributions	Hours this week	HOURS cumulative
Sean	This week I attended the power plant tour and started getting familiar with autocad. I have never used it before so it will probably take a lot of trial and error to get the GA done.	5	36
Bethany	This week, I updated the hourly load data in our spreadsheet and presented it to our client, Adam, on Monday. I also attended the power plant tour this Wednesday. While there, we were able to learn what buildings go to what feeder, and we saw a map of the different 5k and 15k power lines.	4	37
Thomas	This week, I compiled the transformer location and initial OpenDSS research in preparation of our meeting with the client. I attended the client meeting, and also attended a power plant tour on Wednesday 11/19 to help learn more about the distribution voltage layout on campus and different contingencies already in place for power loss.	4	44
Nathan	I could not attend the power plant tour on Wednesday, 11/19 due to a work conflict. I attended the meeting with Adam Arnold on 11/17 and was able to update him on the power factor and voltage information I received from ISU Utilities. I also have compiled some more information into the 2024 load data for the load profiles for each building.	4	34

Mina	This week told the team about the power plant tour and I attended the tour yesterday. It was very helpful and gave us a better ideas of the power plant.		30
MacKenzie	This week, I submitted the initial one-line diagram for client review, took detailed minutes during meetings, communicated with the client to clarify expectations, and started working on the relay functional design. On Wednesday, November 11th, I also attended a tour of the ISU power plant and substation, which provided valuable insights into the campus's power infrastructure and operations.	4	49

o **Comments and extended discussion** *(Optional)*
Regarding non-technical concerns, there are currently no issues. Our team is collaborating effectively, and communication has been smooth across meetings and tasks. We feel confident in our ability to continue working together successfully as we move forward with the project.

o **Plans for the upcoming week**

- Sean: I plan on continuing to work with autocad and getting the general arrangement put together.
- Bethany: My plan for this upcoming week is to work on the design document as well as the OpenDSS model over Thanksgiving Break.
- Thomas: I plan on working on the Excel models for the load data (both overall on campus and by building) and then examining the capabilities to create a load profile visualization in OpenDSS and determining if that is possible.
- Nathan: I plan to continue working with the Excel load profile and update it with current information. I also plan to be consistently in contact with the distribution tam over break to assist with the open DSS model and create a better load shape for the campus.
- Mina: I plan to help as much as possible and attend any upcoming meetings.
- MacKenzie: I plan to continue working on the relay functional as well as await feedback for the initial one-line diagram.

o **Summary of weekly advisor meeting**

Monday 11/18 Distribution Team Meeting with Adam Arnold:

On Monday, Bethany, Nathan, and Thomas met with Adam to discuss the information they'd received from the on-campus utility about power factor rating and per-hour load profile for the campus power draw. The data looked acceptable, and we received instructions on how to proceed. The client wants us to graphically represent this data, find peak winter and summer loads, and identify shoulder days in the summer and fall that will give us four strong data points for the year. They also want us to create a 24-hour load profile visual representation of this data in Excel. A Stretch goal is doing all of this in OpenDSS, the modeling software.