EE/CprE/SE 491 WEEKLY REPORT 1

8/26 - 9/19

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**
- **Bethany Danley - Distribution Planning Team**
- **Thomas Edwards - Distribution Planning Team**
- **Nathan Kallal - Distribution Planning Team**
- **Mina Khalil - Transmission Team**
- **MacKenzie Woods - Transmission Team**

o **Weekly Summary**

- Since the start of the semester, we have been working on meeting as a team, team bonding, and determining goals. We have met with our client at Burns & McDonnell twice. We have set a biweekly meeting on Wednesday afternoons. We have also met with our faculty advisor once and will be setting a meeting time as needed.

o **Past week accomplishments**

- Over the past week, our senior design team made significant progress by connecting with our faculty advisor, who provided us with valuable resources to aid in field evaluation and power usage analysis. We reviewed power usage data and began preliminary research on load profiles, renewable energy integration, and budget constraints for the microgrid system. Additionally, we engaged in team-building exercises and design workshops, fostering collaboration and refining our approach to the project. We're also considering potential shifts in the project scope, focusing on realistic constraints and budget estimations.

o **Pending issues**

- Transmission Team: A pending issue for our transmission team is the lack of detailed models for the current distribution system. Without these models, it's challenging to accurately assess the system's power usage and transmission needs. This has slowed our ability to move forward with the design and evaluation process, and we're relying on further guidance from our faculty/industry advisors and external resources to resolve this.
- Distribution Planning Team:

o **Individual contributions**

NAME	Individual Contributions	Hours this week	HOURS cumulative
Sean	Helped with the team contract and attended team meetings.	3	3
Bethany	Contacted out faculty advisor and set up our first meeting time. Helped write the team contract.	6	6
Thomas	Defined scope for distribution aspect, created shared folder and templates for project deliverables like weekly reports	6	6
Nathan	I contacted our faculty advisor individually to set up a meeting since I was unable to make the initial group meeting due to a work conflict. I contributed to all in-class activities and discussions, including sketch-noting. I could not make the second industry advisor meeting due to a conflict with the career fair. I defined my experience and role for the team contract.	3	3
Mina	Attended all the team meetings for the week. I also did more research about the Iowa State microgrid and substation on my own time to grasp a better idea of the project and the existing conditions.	4	4
MacKenzie	Attended all meetings, actively engaged with both industry and faculty advisors through thoughtful questions, and took detailed minutes of every meeting which I promptly sent to the advisors and the rest of the team. I contributed to in class activities like the sketchnoting exercise during team-building activities, contributed in class discussions, and played a role in drafting the team contract, and assisting in redefining	6	6

	the scope for the transmission team to align the project with realistic constraints and goals.		

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: Contact our utility people and get more information on the current state of the microgrid and the Ames grid. Decide on which software to use and figure out which versions we have access to.
- Bethany: Figure out which software we will be building our distribution model in, so we can get started. Help manage the data for the load profile and start building the data for the load profile of the campus.
- Thomas: Start looking at the data provided for the campus load profile on the facilities planning and management website and see what is and isn't useful. Do some research on website design.
- Nathan: Start looking at the load profile for the campus facilities and forming beginning plans/ideas for how we will build our distribution model. I plan on attending all further team meetings remotely or in person.
- Mina: Talk to the team to come up with questions for Joel Zook which is the Ames Electric Administration. We will need to contact him for information on existing generation capacity. Also help out on the project website.
- MacKenzie: For the upcoming week, I plan to continue attending all senior design meetings and actively engage with both industry and faculty advisors by asking questions and seeking clarification on key project areas. I will maintain my role in taking detailed meeting minutes and distributing them to the team and advisors. Additionally, I will focus on further contributing to the redefinition of the transmission team's scope, ensuring alignment with project goals. I also intend to support the team's research efforts, particularly on load profiles and budget estimates.

o **Summary of weekly advisor meeting**

9/4: Meeting with Adam Arnold, Jennalee Dickson, and Emily Straub (Burns & McDonnell Client)

The second week of classes, we had an introduction meeting with our client. For most of the team we had already established this contact through a summer internship, but for the new members this meeting was a time to share about each other and formally get introduced to the project.

Given the nature of the project being cross-discipline, we established project teams that will be used going forward. Sean, Mina, and MacKenzie will be focused on the Transmission aspects of the project, and Bethany, Thomas, and Nathan will focus on the Distribution Planning aspect. In the meeting, we established basic communication guidelines and expectations on project participation from both the client and the team members. We also discussed the importance of defining a project scope early in the process to ensure that we have a more complete understanding of project timing and anticipated deadlines.

9/16: Meeting with Dr. Wang

On Monday, we had our introduction meeting with our faculty advisor. Due to his travel we weren't able to meet sooner, but in the meeting we introduced ourselves to Dr. Wang and discussed the scope of the project in more depth. A few of us have Dr. Wang in lecture for *EE 4550: Introduction to Energy Distribution Systems*, and after also discussing some previous work experience and intention on pursuing the Power Systems sequence we were able to establish a level of base knowledge.

Dr. Wang expressed strong interest in helping our project succeed, citing his own research in the microgrid field that heavily relates to our project. He also mentioned the Iowa State-led project in Montezuma, where the state's first solar energy microgrid is being built (https://www.news.iastate.edu/news/2024/02/26/microgrid). We provided Dr. Wang with our interpretation of the project, citing the need for a load profile being one of the more important things to develop for the project.

After discussing the project outline, Dr. Wang cited a few key areas that we should focus on. He mentioned creating a strong load profile using existing data that can be found on Iowa State Facilities Planning and Management (FPM) sites (https://www.fpm.iastate.edu/utilities//energy_dashboard/building.asp), and also a further step of trying to identify critical loads and non-critical loads that would be shed during emergencies. He also mentioned looking at the feasibility of generation upgrades (solar panels and battery storage systems) to supplement the on-campus power plant, mainly focusing on the amount of space available as a constraint to expansion. Finally, he also asked us to talk to the client and establish a budget to create a more realistic financial constraint on the project.

Dr. Wang provided us with links to the Iowa State FPM website, as well as contact information of someone who works at the city of Ames and also microgrid modeling resources. Going forward, he mentioned reaching out on an as-needed basis to schedule further meetings, since his schedule is difficult with frequent travel.

9/18: Meeting with Jennalee Dickson and Emily Straub:

On Wednesday, we had our second meeting with our client. During this meeting, we caught them up on what we discussed with Dr. Wang. They had questions about how our load profile was going, and so we shared the FPM website as a source of information that will help us build a foundation.

We also shared with them the ideas of financial constraints that Dr. Wang posed, and clarified that this is a direction we may go in depending on the scope that we define.