

EE/CprE/SE 491 WEEKLY REPORT 2

9/20 - 9/26

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

This past week, we made progress on our microgrid project. While class was canceled due to the career fair, we met with the TA, Mahmoud Ghash, to discuss the scope of the project and inquired about his thoughts on the potential for including solar panels and small-scale wind turbines on campus. We also researched universities with established microgrids, such as UC San Diego, MIT, Illinois Institute of Technology, Princeton, and Santa Clara University. These schools served as valuable case studies for comparison. One key takeaway is that there is no “standard microgrid”, but we plan to draw insights from their approaches to enhance our own optimization of the current design of ISU’s microgrid. Our focus is on balancing clean energy sources with cost-effectiveness and space limitations.

o Past week accomplishments

- Transmission Team: The Transmission Team made strides in defining the project scope more clearly this past week. After reviewing feedback from our faculty advisor, our team began evaluating potential changes to the project’s original goal, including incorporating more realistic budget constraints and exploring contingency plans for power plant failure. We also discussed the possibility of integrating renewable energy sources, such as solar panels and battery storage, into the substation design, based on faculty suggestions. Furthermore, we have started to explore how to create a more conceptual design that aligns with real-world practices and constraints.
- Distribution Planning Team: The Distribution Team focused on data analysis and system evaluation this past week. We utilized the resources provided by our faculty advisor to begin researching power usage in assessing distribution models, reviewing the available data, and making educated guesses on the potential impact of different load scenarios. We

have started preparing our field evaluations and mapping out key areas where improvements or modifications might be needed in the existing distribution network.

o **Pending issues**

- Transmission Team: The main pending issue for the Transmission Team is finalizing the scope of the project. There is still some uncertainty about whether the team should focus on designing a substation or take a more conceptual approach by focusing on budget constraints, materials, and contingency planning. Additionally, the team needs to clarify how much renewable energy (e.g., solar panels, battery storage) should be integrated into the project, based on feedback from advisors. Aligning these project elements with real-world practices while staying within the set time and resource constraints is another challenge our team faces.
- Distribution Planning Team: For the Distribution Team, one pending issue is completing a thorough field evaluation. Although some data on power usage has been gathered, there are still gaps in understanding the full impact of different load scenarios on the current system. We need to dive deeper into existing distribution models and assess how best to integrate renewable energy sources into the distribution network. Our team is awaiting feedback from Ames Utilities as well as the Campus Utilities on their current research, which will then guide our next steps in the project.

o **Individual contributions**

<u>NAME</u>	<u>Individual Contributions</u>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Sean	Met with the team to create questions for utilities. E-mailed the utilities the questions so we can start working on the design part of our project.	3	6
Bethany	Met with the TA, Mahmoud Gshash to discuss the scope of our project and how he's able to assist our team. Emailed our client, Adam, to figure out our access to CYME software. Started analyzing the load profiles of campus.	3	9
Thomas	Helped define scope of the project during the meeting with Mahmoud Gshash. Started looking at the load profile website and different information available in order to design a model.	3	9
Nathan	Met with the TA to help explain the scope of	4	7

	our project. I began Looking at load profiles for the building on campus and getting a sense of what our design will need to contain. Helped formulate questions for the utilities to get an understanding of the current grid situation of the university.		
Mina	Had a meeting with the TA earlier this week to discuss the project scope. I also helped add more questions to be asked for Ames and ISU utilities. I also set up Microsoft team meetings.	4	6
MacKenzie	Led the discussion with the TA regarding the project's scope. I also helped to formulate key questions for Ames/ISU utilities, facilitating the team's understanding of local infrastructure and potential project adjustments.	6	12

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: Continue emailing the utilities and get all of the information that we need to continue with our project. We will start splitting more into our groups and working on getting some designs done as soon as we get all of the relevant information.
- Bethany: Finalize which software we will be using. Create a spreadsheet to start tracking the load profile information. Determine which information we believe to be accurate from the website and then which we will have to estimate.
- Thomas: Dig deeper into the load profile website and start making predictions on which loads are going to be primary loads, and which may be loads that are first to be shedded in times of limited power. Also, start looking at alternative options for modeling softwares if CYME isn't provided.
- Nathan: Continue looking at load profiles for the buildings on campus and jot down areas of concern I see. I want to get in contact with an engineer in the city of Ames. I feel that he might better understand the questions we may need to ask in the future. I plan to join the advisor meeting next Wednesday and discuss with Thomas, Bethany, and the company

advisors what software we have decided to use to model the grid.

- Mina: As we have planned, we will send more emails to Prof. Jon Flemming and Facilities Planning and Management. I will attend all the meetings but the one for tomorrow i will not be able to attend as I will be doing surgery but other than that I should be there for everything else and contribute as much as I can.
- MacKenzie: We plan to follow up with the utilities regarding the questions that Sean sent, attend any scheduled meetings, and continue taking detailed minutes for distribution to the industry and faculty advisors. Additionally, I will focus on refining the project scope with the transmission team, incorporating feedback from the TA and utilities. I will also assist in gathering more data on microgrid implementations at other universities and contribute to preparing the team's next progress update.

o **Summary of weekly advisor meeting**

We did not hold any meetings this week with our advisor or client. As mentioned previously, we will have client meetings every other week, and we are meeting with our advisor on an as-needed basis based upon his recommendation.