

EE/CprE/SE 491 WEEKLY REPORT 3

9/27—10/3

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 week, our team met to discuss ongoing efforts and challenges in our senior design project. We highlighted our outreach to Ames Utilities, which has responded, while we are still awaiting a reply from Campus Utilities. Our primary focus remains on gathering utility data and conducting further research. We explored software options for modeling our microgrid, considering CYME despite its cost, and discussed action items for Bethany to inquire about alternatives and assistance from our faculty advisor. We reviewed the campus load profile to map our circuits and load profiles, acknowledging that assumptions may be necessary due to incomplete data from utilities. We emphasized the need to engage in substantial engineering tasks, integrating transmission and distribution calculations into our project. The renewable energy focus will involve modeling distribution while considering theoretical power generation from wind and solar farms entering a substation. We also recognized the need to refine our project scope further, planning collaboration among Sean, Mina, and MacKenzie to solidify the substation component, with a follow-up meeting soon to be scheduled with Emily and Jenalee (the substation client advisors). Lastly, our faculty advisor will provide a demo of a software alternative to CYME in his October 3rd class the majority of our team members are in.

o Past week accomplishments

- Transmission Team: We established communication with Ames Utilities, which provided valuable information, while still awaiting a response from Campus Utilities. Our team emphasized the importance of conducting substantial engineering tasks rather than merely modeling and agreed to focus on integrating transmission and distribution calculations into our project. We began refining the scope of our substation component and planned collaboration to solidify this aspect further, with a follow-up meeting schedule with our

client to ensure alignment.

- Distribution Planning Team: Learned that CYME does not offer a student license and will need University funding to pay for the software. We got in contact with our faculty advisor on if there is a possibility to get this paid for. We started a spreadsheet to organize the data from the Energy Database so we can input it into our model when the software is determined.

o **Pending issues**

- Transmission Team: The lack of response from Campus Utilities regarding the information that we requested. This delay hinders our ability to gather necessary data for modeling the microgrid as well as our substation effectively. We need to finalize the scope for the substation component to ensure we are on the right track for our engineering tasks, which remains a work in progress.
- Distribution Planning Team: There are ongoing discussions about which software to use for modeling, particularly concerning the cost of CYME and the need to find suitable alternatives that meet our project requirements.

o **Individual contributions**

<u>NAME</u>	<u>Individual Contributions</u>	<u>Hours this week</u>	<u>HOURS cumulative</u>
Sean	Emailed people that know more about the ISU microgrid. We need to find information on where there are connections to the Ames grid and the load that they can handle.	4	10
Bethany	Emailed client Adam Arnold to figure out if CYME would be a software that we could use to model our microgrid. Emailed our advisor Dr. Wang about seeking help from the University on paying for a CYME license. Created the spreadsheet to start tracking the load profiles. Emailed Campus Utilities to get access to the 2023 load data from each day to determine peak loads.	3	12
Thomas	I attended all team meetings, worked on file organization in the shared drive, and attended class from our faculty advisor that was showcasing OpenDSS, a potential alternative to the CYME license that is proving tricky to obtain. I also continued figuring out how to edit the team website,	3	12

	uploading the first 2 reports and adding team member names and a section for lightning talks.		
Nathan	I continued looking at campus load profiles from the campus website. Attended all team meetings. Attend an extra class taught by our faculty advisor to learn about OpenDSS, an alternative modeling software since it is unlikely we will be able to obtain a CYME license due to cost	3	10
Mina	I was not able to attend meetings this week due to the surgery I had on last Friday, and that made me stay at home. I did attend the Burns and Mac meeting on Wednesday because it was online.	2	10
MacKenzie	I attended all team meetings, took detailed minutes, and shared them with the faculty and industry advisors. My contributions included engaging with the team on refining the project scope and collaborating with teammates to gather relevant research insights, ensuring a comprehensive approach to the project.	3	15

o **Comments and extended discussion**

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 finding all that we can about the power grid. We will finalize the scope and work with our clients to come up with some constraints. Then we will start working on autoCAD to start modeling the current grid and start calculations for any additions that we want to make.
- Bethany: Explore future one whether we will be able to access CYME as the software we can use for building our model or if OpenDSS will be a better option. Hopefully will

receive the 2023 daily and hourly load profile data from ISU utilities. With this data we can create pivot tables and an ALA. This will be the base data that we will be using to build our model.

- Thomas: I am going to continue setting up the website. Hopefully, based on the emails Bethany has been sending with ISU utilities we will also have access to the data from campus power usage from last year and we can work on creating a pivot table to better analyze the data and create expected power consumption and load profile.
- Nathan: Continue working with Thomas and Bethany to figure out what software we can use to model the microgrid. Based on Bethany's emails with ISU utilities, we should have plenty of load information available to us. I will communicate with Bethany and Thomas to get a better understanding of how they go about planning and the tools they use, such as pivot tables. I also plan to take a closer look at aerial maps of the campus to find possible physical issues that our design could run into
- Mina: I plan to start finding a time when I, Sean, and MacKenzie will be able to find a time to talk more specifically for the transmission team. I also plan to go to all the next meetings that I'm able to go to. I plan to gather more information and contribute more.
- MacKenzie: I plan to continue to refine the project scope for the substation component, collaborating with Sean and Mina to solidify our approach. I will also focus on organizing the information gathered from Ames/ISU utilities and preparing for the follow-up meeting with Emily and Jenalee. Additionally, I aim to contribute to discussions around incorporating renewable energy aspects into our project model, particularly regarding wind and solar generation, while ensuring that the engineering tasks are robust and well-defined.

o **Summary of weekly advisor meeting**

10/2 Meeting with Client (Adam Arnold, Jennalee Dickson, Emily Straub):

On Wednesday, we held our third meeting with the client. During this meeting, we talked about advancements in the process of receiving modeling software in order to create the prototype model for the on-campus microgrid. We discussed ways to approach receiving funding from the university to obtain a student license, since the client hasn't allocated resources to provide this software and their company contacts were unable to obtain a license. From a substation side, the discussion centered around making sure the model is intentional and not just based off of a picture. There were also some talks about the prospect of adding in renewable energy sources to the grid, although in practice the client asked us to further think about how this tied into the substation focus we had emphasized due to internship experience.