

## ***EE/CprE/SE 491 WEEKLY REPORT 8***

***11/1-11/7***

***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**

- Transmission Team: During the past week, we focused on refining our approach to the technical aspects of the substation project, especially following the scope change in Week 10. We revisited the software and tools needed for the project, confirming the use of AutoCAD and PSCAD for design and simulation. Our activities included evaluating the feasibility of these tools, ensuring they align with client requirements and our team's capabilities. Key inputs such as client preferences and advisor insights played a significant role in guiding our choices.
- Distribution Team: During the past week, the distribution team has further developed the load profile of campus. Our meeting with the client last week let us know that we had a strong start to the profile but needed further data, and so our team has reached out to our contact at the ISU utility again to gain some more clarifying information. We received a response from this email, and plan on analyzing it in anticipation of a meeting next week with the client.

### **o Past week accomplishments**

- Transmission Team: This past week, the transmission team made significant progress by finalizing the site for the new substation near the old coal lot by Fredrickson Court/Haber Road. During Week 10, the team updated the project scope. The team also conducted research into potential battery storage options that would best suit the substation's requirements. Work on developing an initial one-line diagram began to provide a clear visualization of the new substation layout, including battery integration. Additionally, team members collaborated on the technical complexity analysis to assess the challenges associated with integrating battery systems and substation modeling.

- Distribution Planning Team: The distribution team has begun model development in OpenDSS. The team is still a bit limited in what can and can't be done due to a lack of response to emails sent out, but the team is laying the groundwork in the model to ensure that as soon as the information is received, it can be used to further aid the model and create campus load curves.

o **Pending issues**

- Transmission Team: A pending issue the transmission team faces is the late-in-the-semester change to the project scope, which has required the team to quickly adapt and shift focus. While this change introduces challenges in terms of reworking timelines and reallocating resources, it comes with the benefit of increased guidance and support from clients. This added input is expected to help the team navigate the new direction more efficiently and align the design to meet client expectations.
- Distribution Planning Team: As mentioned briefly above, the main pending issue is just the response time for information requests from the utility and campus contacts. This is expected and not something we have much control over, and we are working to keep the project moving forward as we wait.

o **Individual contributions**

<b><u>NAME</u></b>	<b><u>Individual Contributions</u></b>	<b><u>Hours this week</u></b>	<b><u>HOURS cumulative</u></b>
Sean	We had multiple meetings with the client to refine our scope. We have finally received cells to start finishing our AutoCad design. I did some work on the design documentation for the lecture part of class.	3	26
Bethany	I emailed ISU Utilities to follow up on my email from last week. We are still waiting on the data from each hour of each day. In addition to this I worked on familiarizing myself with OpenDSS. I worked on building practice modeling in order to make sure I understand the software.	3	30
Thomas	I redid the in-class OpenDSS training in order to prepare for the actual model creation and familiarize myself with the software capabilities. Then, I spent some time trying to implement the GIS capabilities in the software and starting the actual model creation.	6	33

Nathan	I contacted one of the people at ISU utilities to obtain information that we will need to set the baseline voltage for the distribution circuit. I also obtained power factor information from campus utilities that will help us create a load shape and final load profile for each building	4	28
Mina	This week we had a meeting with the client to talk about scope and areas of improvement so I have attended that. We have a deliverables folder now where we can share out one line diagram and get feedback.	3	27
MacKenzie	I have significantly contributed to the progress of the transmission team over the past few weeks. I have been responsible for taking detailed minutes during each meeting, ensuring that important discussions and action items are recorded and shared with everyone involved. I facilitated the creation of the journey map and led the technical complexity analysis to provide clear insights into our project's various components. Additionally, I took the lead in conducting the battery comparison analysis, which is vital for selecting the best energy storage solutions. I have also been actively working on the initial stages of developing the one-line diagram for the substation and performing research to support our updated project scope.	6	37

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: My plan for the next week is to delegate the tasks and we can all start working on our individual project parts. We need to finalize our one-line diagram before we can start on that so we will all make final changes and send it in to the client to approve it.
- Bethany: My plan for the next week is to hopefully receive the additional data we need from ISU Utilities. With this data, I will add it to our load profile spreadsheet to discuss with our client Adam. I will also continue to work and learn in OpenDSS
- Thomas: I plan on continuing the model development in OpenDSS for the on campus microgrid. I also plan on attending the meeting with Adam Arnold on 11/13 to further discuss the new load data and progress, and how to implement that into a model.
- Nathan: I plan on assisting Thomas with the OpenDSS model. Using the information that me and Bethany have obtained from campus utilities, we should be able to work with Adam Arnold to finalize some load data and begin inserting information into the OpenDSS model. I also plan to analyze the location of each building's transformer on campus.
- Mina: In the next week I plan to meet sometime with the team and breakdown tasks and deadlines so we can distribute the work and each team member is contributing. I also plan to attending all the meetings.
- MacKenzie: In the upcoming week, I plan to focus on advancing the one-line diagram for the substation, incorporating feedback from our last meeting to refine its layout and ensure seamless battery integration. I will also continue researching technical specifications to support our battery selection process, aiming to solidify our choice based on performance and compatibility. Finally, I plan to continue documenting meeting notes and key discussions to maintain clear communication and project tracking.

#### o **Summary of weekly advisor meeting**

11/1 Substation Team Meeting with Jenalee, Seth, and Emily:

**Attendees:** MacKenzie, Sean, Mina, Jenalee, Emily, Seth

#### **Key Discussion Points:**

##### **1. Current Substation Project Scope:**

- a. It was confirmed that there is not a viable, realistic substation project at ISU for this context. The team has considered either pursuing a realistic project, closely defined by our industry advisors, or exploring a more creative project design that would not necessarily be implemented but would provide valuable educational experience.

##### **2. Project Role and Focus:**

- a. The project direction is flexible: the team could pursue a greenfield substation project involving battery storage to add capacity to the distribution system, avoiding direct complications between the existing substation and distribution connections. This new direction should allow the team to work in parallel with the 1898 group, with separate components integrating toward project completion.

**3. Deliverables and Schedule:**

- a. Seth will provide a list of standard deliverables typically associated with greenfield substation projects. Expectations include delivering one-line or three-line diagrams by the semester's end, and a clear project scope (69kV–13.2kV system with a transformer, distribution feeders, and potential battery storage integration).
- b. The team was advised to update the Gantt chart and combine it with the deliverable worksheet for enhanced tracking.

**4. Recurring Meetings and Structure:**

- a. Moving forward, substation-specific recurring meetings will be set up. Seth will outline weekly or bi-weekly meeting topics to ensure a structured approach to deliverables, keeping project activities on schedule.

**5. Action Items:**

- a. Update the Gantt chart and deliverable worksheet with the new project scope.
- b. Schedule recurring substation-specific meetings.
- c. Confirm all advisors have access to the shared Google Drive.

**11/6 Distribution Meeting with Adam:**

This meeting was scheduled to occur, but didn't happen since the emails that we sent out as request for more information were not answered in time. The meeting has been moved to 11/13, where we will have the same agenda of revisiting the load profile and looking at the start to the model.

**11/6 Transmission (Substation) Meeting with Seth, Emily, and Jenalee:**

We discussed the scope and timeline for the remainder of the semester. Our team requested cells for our models so we can start finalizing the designs.