

PROJECT:	115 kV/34.5 kV Solar Power Plant/Substation Design Project
CLIENT:	Black and Veatch Corporation
CLIENT CONTACT:	Adam Literski
ADVISORS:	Venkataramana Ajjarapu, Anne Kimber
TEAM EMAIL:	may1602@iastate.edu

CHASE BENTON:	Team Leader / Key Concept Holder
SENKO DIZDAREVIC:	Team Communication Leader / Key Concept Holder
ARIF IBRAHIM:	Team Webmaster / Key Concept Holder
MAKOKO MUKUMBILWA:	Team Webmaster / Key Concept Holder

ACOMPLISHMENTS

Our initial calculation of 163-164 acres of land for a PV plant was wrong due to the usage of a wrong power rating on the solar cell. We were underestimating the demand and reliability of solar radiation over a year. Thus we recalculated using a 325 W rating from a different class of PV modules. Our new yet to be client approved calculation is about 122 acres.

MEETING NOTES

Dr. Kimber Meeting 09/21/2015 2:00-2:30pm

This meeting with Dr. Kimber consisted of a discussion of sources to assist in PV plant design. The initial information of solar intensity in any given area was a major issue. She provided us with reputable online sources for average daily solar energy information to utilize. It was also recommended that we obtain kWh usage for a specific load such as the campus.

It was also recommended that we not directly attach our PV plant to the transmission system but try to inject power at the distribution level.

We were also instructed to see Randy Larabee and possibly arrange a substation tour.

Client Meeting 09/23/2015 2:00-3:00pm

Adam Literski, our head client advisor was not present at the phone conference due to illness. We met with Rahul Ramanan, his substitute. We explained our progress to him in detail, he expressed some doubt in our calculation but what was not able to give us better advice due to not being assigned to this project. He also pointed out the wrong power density we used in the PV module spec sheet which in tern we used to redo our area calculations.

Dr. Ajjarapu Meeting 09/23/2015 3:00-3:30pm

Dr. Ajjarapu proposed a question that we needed to have clarified by our client before proceeding design, would this be a stand alone substation with PV plant power transmitted or would the PV plant be attached with a minimal distance.

Equally importantly we discussed solar array output voltage, and a need to come up with a solution to the large amount of current produced when arrays are paralleled to the inverter. He provided some possible solutions to reduce conductor size connecting the PV array to the inverter.

PENDING ISSUES

We are unsure how to use the array parameter tool provided by Adam. We know that we are having issues because we cannot obtain an ILR (inverter load ratio) of 1.30.

WEEK SUMMARY

A lot was discussed this week and not a lot was finalized, but we are learning how to make decisions based on our research and advisor recommendations. The meetings presented a lot of information to discuss and issues to work out. Overall, we know the area required for our PV plant and we have a good idea of how the arrays and strings need to be arranged to produce a manageable current to the inverter.

GOAL FOR NEXT WEEK

Figure out the array parameter tool provided by Adam Literski. Finalize PV module and inverter specifications, including but not limited to conductor sizes for strings of arrays and PV to inverter conductor sizes.

INDIVIDUAL CONTRIBUTIONS

Chase Benton:

- Made initial calculations for PV plant area requirements.
- Sent client meeting follow up email detailed discussion matter to Adam Literski.

Senko Dizdarevic:

- Reworked PV plant area calculations as per client recommendations.
- Researched PV plant string size and voltage limitations.
- Completed weekly report.
- Started design document.

Arif Ibrahim:

- Researched substation layout, single bus bar.
- Researched commonly used grounding methods.

Makoko Mukumbilwa:

- Researched advantages/disadvantages of bulk oil circuit breakers and of minimum oil circuit breakers.

HOURLY CONTRIBUTIONS

Team Time Contribution Week 4 (hours)		
Member	Week Contribution	Individual Cumulative
Chase Benton	5.0	11.0
Senko Dizdarevic	6.0	13.5
Arif Ibrahim	3.0	7.5
Makoko Mukumbilwa	2.5	7.0
Team Week Total	16.5	
Team Cumulative Total	39.0	