115/34.5KV SOLAR PLANT & SUBSTATION

BLACK & VEATCH

IOWA STATE UNIVERSITY
Department of Electrical and Computer Engineering

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AGENDA

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SAFETY MOMENT

Electrical Safety for PV Installation

1. Find all the overhead power lines. Before you start any installation, you should find all the power lines in the area so that you don't touch them by chance. To make sure everyone is aware, use site maps and visual checks.

2. Consider all overhead lines live and dangerous, even if they don't look like they're doing anything. This way of thinking keeps workers alert around electrical dangers and keeps them from getting too comfortable.

3. Keep a 10-foot distance: Keep at least 10 feet between you, your tools, and any power lines that are above you. This space helps keep people from accidentally touching, which could hurt or kill someone.

4. Move ladders and other long items horizontally. To avoid touching power lines by mistake, move ladders, poles, and other long items horizontally when moving them on the ground.

PROJECT OVERVIEW

Because of increasing utility renewable energy requirements, Iowa State University has been involved in the development of a 115/34.5kV Distribution Substation and a 60 MW Solar Plant. Our team will manage the whole design process, from the solar layout, electrical layout through all associated construction deliverables. The reliability and safety of the substation will be ensured with critical calculations such as load-flow analysis, short-circuit studies, system protection, and grounding. Our team will then develop an original tool that will be utilized for the optimization of elements of conceptual design. In this process, creative problem-solving is encouraged. Black & Veatch will give the conceptual design information and standards that shall guide our team throughout the project.

PROBLEM STATEMENT

Due to the increase in renewable energy demand, our team will design and simulate a 60 MW solar farm and the associated substation to connect it to the grid to help meet growing demands. The solar farm will be designed in the first semester, followed by the substation design in the second semester.

<u>Project Details and Phasing:</u>

Solar Farm Design – Focusing on optimal layout and panel efficiency

Substation Design – Focusing on grid connection efficiency, stability, compliance with standards

<u>Impacts and Objectives:</u>

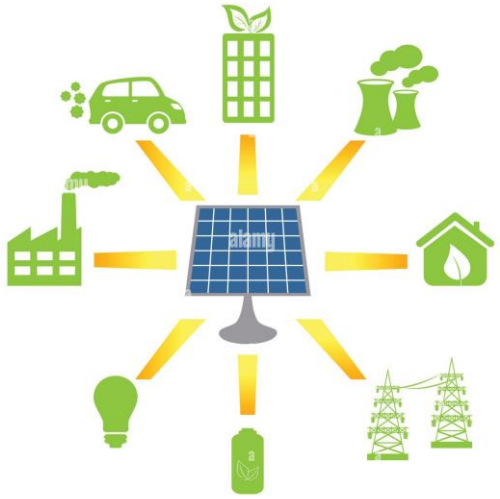
Environmental Contribution – supports environment sustainability by providing clean source of energy

LIST AND DESCRIPTION OF USERS

Utility Companies: Manage and operate the substation and solar plant, making sure power is safely and effectively transferred to customers

Residents: Local communities will benefit from reliable and sustainable energy. Homes will be able to use the power generated by the solar farm

Businesses: Both large and small-scale businesses will use the electricity from the solar farm



USER NEEDS

Reliability and Safety: High priority for utility companies and regulatory organizations

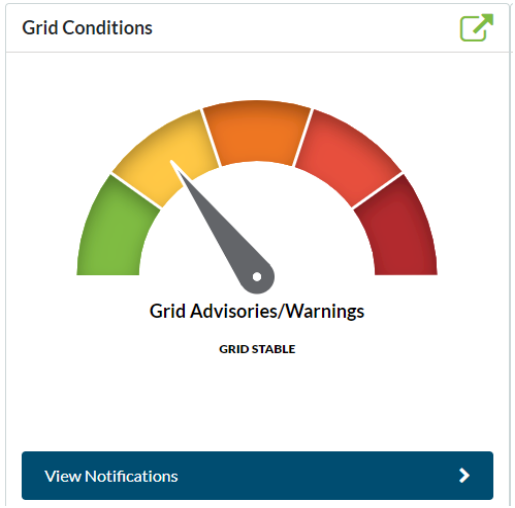
- Systems with sail-safes to prevent outages and minimize risks

Cost-Effectiveness and Efficiency: Essential for both the utility companies and the local consumers/businesses

- Profitable in the long-run and will benefit the community as well

Sustainability: Reduce carbon footprints and promote clean energy

Room for Growth: Solar farm and substation must be constructed with growth in mind for the future



CONCLUSIONS

Key Project Highlights

Renewable Integration:

- Our solar farm aims to meet the ongoing demand of renewable energy integration

Benefits to The Community:

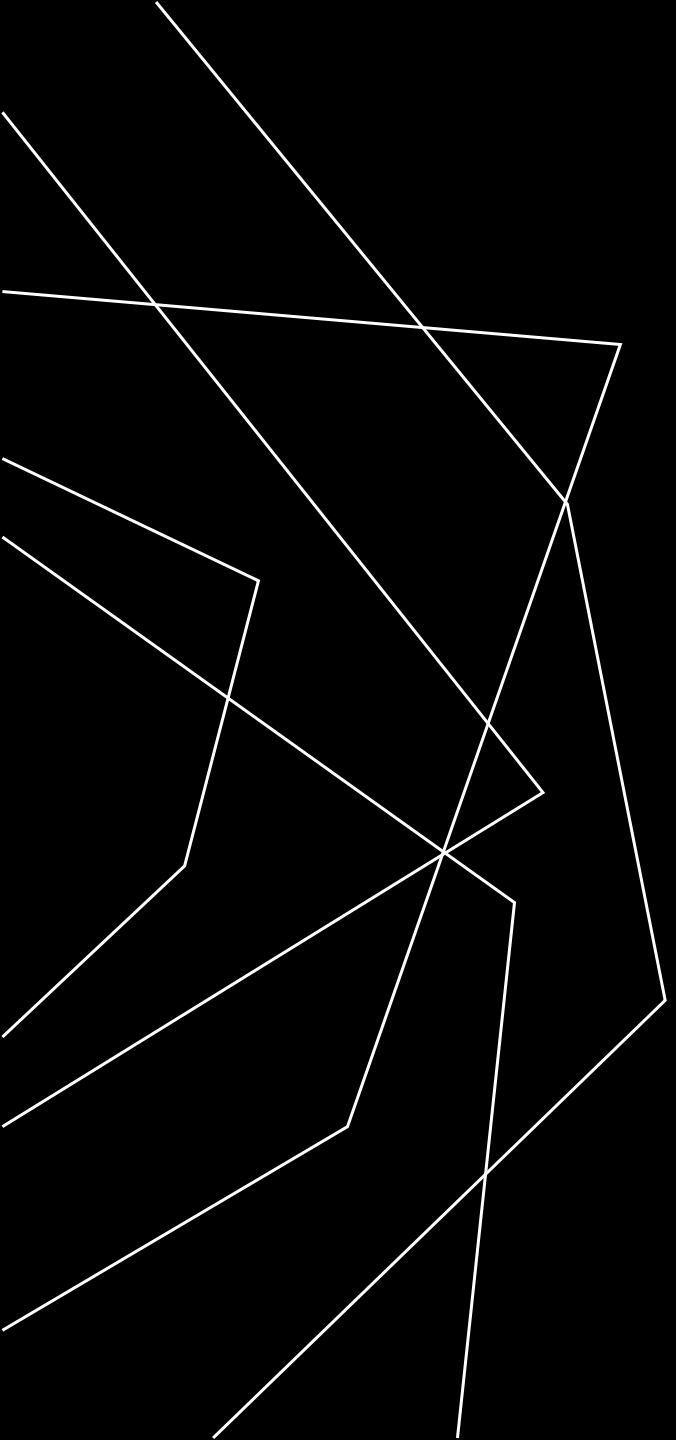
- Provides a 100% clean, and abundant supply of electricity for use in the local community

Design:

- We will first design the solar farm and then the substation, ensuring our design is to proper standards
- Perform critical calculations such as load-flow analysis, short-circuit studies, system protection, and grounding

Closing Remarks

We are dedicated to creating a sustainable and efficient energy solution that benefits all of our users, paving the way for a cleaner, more resilient energy future.



THANK YOU

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