

Project Title: 115/34.5KV Solar Plant & Substation

1. Introduction

1.1 Problem Statement

Nowadays, the world faces growing concerns over climate change and the increase of non-renewable energy resources, the need for sustainable energy solutions has become increasingly urgent. Traditional energy sources, such as coal and natural gas, contribute significantly to environmental degradation and greenhouse gas emissions. As global attention shifts toward renewable energy to mitigate these effects, large-scale solar power plants have emerged as a crucial solution. The 115/34.5 kV Solar Plant & Substation Senior Design Project will be implemented in Luna County, New Mexico. Our clients Black & Veatch aims to address the challenges associated with transitioning to cleaner energy. Black & Veatch is a consulting company and working in collaboration with us ISU students (group41) for designing this solar plant to generate clean, sustainable electricity that can be efficiently integrated into the local power grid. Luna County, with its abundant solar resources, provides the ideal environment for implementing solar energy on a large scale.

This project not only contributes to minimizing carbon emissions or provide job opportunities in New Mexico, but also supports the global shift toward renewable energy. Using engineering concepts, we will implement an additional way to generate renewable energy and integrate it into the electrical systems by designing a 60MW solar farm and substation. We will be focusing on designing the solar plant for the first semester, then work on the substation for the second semester.

1.2 Intended Users

1. Utility Companies

- Description: Utility companies responsible for distributing electricity to residential, commercial, and industrial sectors.
- Need: As part of the energy transition, utility companies require reliable, sustainable power sources to meet demand, reduce emissions, and comply with renewable energy regulations.

- Benefit: The solar plant will provide a consistent, renewable power supply that utility companies can distribute to their customers. This supports their goals of reducing environmental impact while ensuring a stable energy supply. Additionally, utility companies can benefit from lower operational costs due to the long-term savings associated with solar energy.

2. Black & Veatch Clients

- Description: Corporations, municipalities, or governments that engage Black & Veatch to develop renewable energy solutions.

- Need: These clients seek to invest in sustainable infrastructure projects that align with their environmental goals and corporate social responsibility initiatives. They also require innovative, cost-efficient designs that can be scaled or replicated for future projects.

- Benefit: Through this project, clients of Black & Veatch will gain a model for developing large-scale solar plants, benefiting from the company's engineering expertise and track record in renewable energy.

3. Local Communities in Luna County

- Description: Residents and businesses in the Luna County region who will directly benefit from the availability of clean energy.

- Need: Access to affordable, reliable, and clean electricity is a growing concern for local communities, especially in regions where energy costs are high and non-renewable sources dominate.

- Benefit: The solar plant will provide local residents and businesses with a reliable source of clean electricity. This can lead to lower energy bills, reduced dependence on non-renewable resources, and a smaller environmental footprint for the community. The project also enhances local job opportunities during the construction and operation phases.