Comparative Analysis of Implementing Solar Energy in South Carolina

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Background

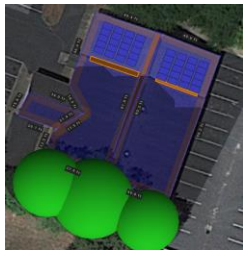
Solar energy is becoming an increasingly popular method of energy production across South Carolina, accounting for 3% of the state's total produced energy (1). This study was conducted in partnership with the Medical University of South Carolina (MUSC) in order to design and determine the most efficient designs for structurally differing buildings in the MUSC complex.

Methods

Building assignments were provided by MUSC, which were uploaded to Helioscope™ to design solar arrays. Depending on the roof specifications, module racking and specifications were determined. Once Helioscope™ designs were completed, the energy bill history provided by MUSC was used to determine system size based on energy consumption. Using collected data from the energy bills such as utility and rate types as well as system size, a report was produced using Energy Toolbase™ to determine the benefits or drawbacks of the implementation of solar energy.

Results

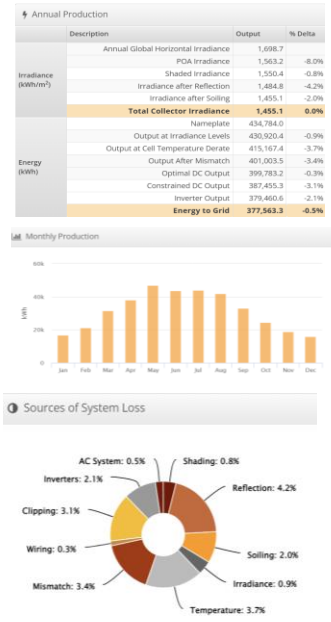
Building Designs:



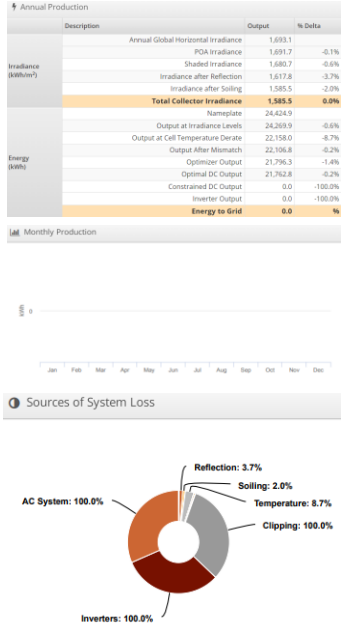
Project A (top left) is a large medical complex located in the Duke Energy Process service area. The complex has an average 12-month usage of 366,351 kWh, and the designed system has a maximum yearly production of 377,563 kWh. Project B (top right) is a small foot clinic located in the Duke Energy Process service area. The clinic has an average 12-month production of 7,268 kWh, and a design producing 7,674 kWh per year was produced, however there was a heavy tree presence around the building that had to be accounted for.

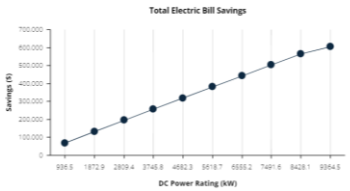
Helioscope Results:

Project A

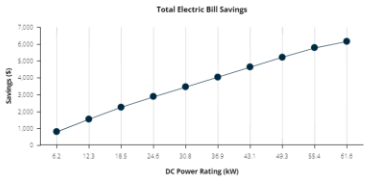


Project B





Through Energy Toolbase™ we were able to find the amount saved by installing solar. Project A (left) was able to save up to $605,028, while Project B (right) can save up to a total of $6,164 if the 100% of the energy demand came from solar.



Discussion

After all reports were ran and projected outcomes were analyzed, there were a few conclusions drawn. The first conclusion noted was that Project A was a front runner for implementation, whereas Project B did not produce enough energy to justify installation costs. Project A has the capability to produce 377.6 MWh annually and save the consumer a significant amount in energy costs, averaging 7¢ per kWh. Project B had the potential to save energy costs as well, however due to the partial obstruction of the array by the nearby trees as well as the nature of the pitched roof, production is highly impeded. This resulted in the nullification of Project B.

Acknowledgements

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Reference: (1) "U.S. Energy Information Administration - EIA - Independent Statistics and Analysis." *EIA*, 19 Jan. 2023, https://www.eia.gov/state/analysis.php?sid=SC.